GeoEngineers
523 East Second Avenue
Spokane, Washington 99202
509.363.3125

August 29, 2019

Toxics Cleanup Program
Washington State Department of Ecology
4601 North Monroe Street
Spokane, Washington 99201

Attention: Sandra Treccani

Subject: Carnation Dairies Spokane Garage Historical UST Release
444 West Cataldo Avenue
Spokane, Washington
File No. 0110-148-16

This letter summarizes current and historical conditions related to a leaking underground storage tank (LUST) at the Carnation Dairies of Spokane Site located at 444 West Cataldo Avenue in Spokane, Washington (herein referred to as the "site") as depicted in Vicinity Map, Figure 1. Key site features are depicted in Site Plan, Figure 2. For the purposes of this report, the site is identified as tax parcel 35181.4206.

Environmental site assessments at the site have indicated the presence of metals, polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons greater than Model Toxics Control Act (MTCA) Method A cleanup levels at the site.

We understand the City of Spokane (City) plans to construct the Sportsplex project at the site and on surrounding parcels including the current Cataldo Avenue. The Sportsplex will be a multi-use regional sports facility to host multiple local and regional sporting events. The City would like to import soil contaminated with PAHs and metals from the neighboring Riverfront Park to fill low areas at the site. The low areas subsequently will be capped with the Sportsplex building.

INTRODUCTION AND BACKGROUND

During removal of two underground storage tanks (USTs) at the site in August 1989, a fuel release was discovered and approximately 100 cubic yards of contaminated soil were excavated from the location of the former USTs (Cahalan 1990). On August 16, 1989, the State of Washington Department of Ecology (Ecology) was notified that a fuel release had occurred from one or two underground storage tanks located at the site (Leinart 1989). Each tank capacity was approximately 10,000 gallons. One UST contained gasoline and the other contained diesel fuel, as shown on Figure 2. At the time, the site was owned and operated by the Inland Northwest Dairies.

Soil sampling conducted in 1989 indicated four of the 51 soil samples collected exceeded 200 parts per million (ppm) concentration (the cleanup level in 1989) for total petroleum hydrocarbons (TPH) (Cahalan

1990). Groundwater samples collected in 1989 did not indicate the presence of petroleum contamination (Cahalan 1990). Available documentation (Cahalan 1990) indicates the soil was stockpiled at the site and Inland Northwest Dairies planned to allow the contaminants to volatilize over time. The eventual fate of this soil is unknown. It is also unknown if additional remedial actions were undertaken based on our review of available information reviewed in Ecology's files.

CH2M Hill, Inc. (CH2M) conducted a Phase II Environmental Site Assessment (ESA) at the site in March 1999, which included advancing 11 test pits on or near the site. Petroleum contamination in soil greater than the MTCA Method A cleanup level was identified in one test pit, TP-4, which was advanced in the area of the former fuel dispensers adjacent to the southeast corner of the building identified in a Phase I ESA conducted in 1998 (Leppo 1998). Heavy petroleum staining and odors were observed approximately 4 feet below ground surface (bgs) where bedrock was encountered. The contamination appeared to extend to the foundation of the dairy garage to the west and to the north. Analytical results indicated gasoline-range petroleum hydrocarbons (GRPH), diesel-range petroleum hydrocarbons (DRPH) and oil-range petroleum hydrocarbons (ORPH) were detected at concentrations greater than the MTCA Method A cleanup levels (CH2M 1999a). Concentrations for GRPH, DRPH and ORPH were 24,000 mg/kg, 4,400 mg/kg and 430 mg/kg, respectively.

In August 1999, CH2M conducted a "Focused Subsurface Investigation" at the site, which included advancing three soil borings near the former USTs using hollow stem auger drilling techniques. Grab groundwater samples were collected from two soil borings near the USTs (SB-2 and SB-3) using a disposable bailer and temporary well casing. Groundwater was not observed in boring SB-1.

Diesel contamination in groundwater greater than the MTCA Method A cleanup level was detected in one soil boring (SB-2) which was advanced approximately 70 feet west of the former dairy garage building. Petroleum staining or odor was not observed in the soil borings and soil samples were not analyzed for petroleum contamination. Groundwater was observed at 27.29 feet bgs, and the boring was advanced to a total depth of 30.21 feet bgs (CH2M 1999b) where it met refusal on assumed bedrock. Groundwater from boring SB-3 located approximately 40 feet away from SB-2 did not have detectable concentrations of petroleum contamination. The site was left relatively undeveloped after the site investigations in 1999. Remedial activities or site development was not conducted after the 1999 investigations. The site was primarily used as a storage and parking area after it was acquired by the City in the May 2000.

During our review of the Ecology file, a "Subsurface Basalt Relief Map" for the site, produced by Anania Geologic Engineering, April 24, 1990 was identified. This map indicated a subsurface basalt depression located about 30 feet southwest of the former tanks where the top of basalt was about 20 to 25 feet lower than the surrounding basalt creating an area where infiltrating water could settle on the underlying basalt surface.

GEOENGINEERS GEOTECHNICAL AND ENVIRONMENTAL ASSESSMENTS

In October 2018, GeoEngineers conducted a Preliminary Geotechnical Evaluation for the Sportsplex, which included advancing 16 soil borings using hollow stem auger drilling, collecting soil samples for laboratory analysis, and conducting a geophysical survey at and surrounding the site. Analytical results indicated soil samples from three borings (B-4, B-9 and B-16) contained concentrations of contaminants greater than the MTCA Method A cleanup levels. Two borings (B-8 and B-9) were located within tax parcel 35181.4206.

Sample results from B-9 at 3.5 to 5 feet bgs indicated PAHs, lead and cadmium were present at concentrations greater than the MTCA Method A cleanup level.

Soil boring B-8 was advanced near the location of the CH2M boring SB-2 and the former USTs to a depth of 30 feet bgs as shown on Figure 2. Groundwater was encountered about 27.6 feet bgs. Field screening indicated the presence of petroleum hydrocarbons in boring B-8 and a soil sample was collected from approximately 28.5 to 30 feet bgs. GRPH, DRPH and ORPH were detected in this soil sample, but at concentrations less than the MTCA Method A cleanup levels. A summary of laboratory test results is presented in Table 1 below.

As part of the Sportsplex geotechnical evaluation, a geophysical survey was conducted to estimate the depth to bedrock for the Sportsplex site. The survey indicated the site is located on a closed depression in the bedrock at a depth of approximately 30 feet bgs, as shown in Figure 3 (GeoEngineers 2019a).

Additionally, GeoEngineers completed an environmental assessment of the site in 2019, which included advancing three test pits (CD-TP-1 through CD-TP-3) near the CH2M Phase II ESA test pit TP-4 to depths ranging from 2.5 to 4.5 feet bgs. Petroleum staining was observed in all three test pits at depths ranging from 1 to 2 feet bgs. The samples collected from the test pits did not exhibit evidence of petroleum hydrocarbons using water sheen and photoionization detector (PID) measurements. Samples from CD-TP-1 and CD-TP-3 were collected from depths indicating the greatest levels of petroleum contamination based on visual observations and were analyzed for petroleum hydrocarbons. A soil sample for CD-TP-2 was not submitted for chemical analysis. Gasoline, diesel and oil-range petroleum hydrocarbons were not detected above MTCA Method A cleanup levels (GeoEngineers 2019b). A summary of laboratory test results is presented in Table 1 below.

TABLE I: CHEMICAL ANALYTICAL RESULTS FROM GEOENGINEERS 2018 AND 2019 ASSESSMENTS - SOIL

Analyte[1]	Units	MTCA A CUL[2]	Sample Location ID (Depth[3])		
			B-8 (28.5-30.0)	CD-TP-1 (1.0-2.0)	CD-TP-3 (0.5-1.0)
			10/25/2018	5/23/2019	5/23/2019
GRPH	mg/kg	30	**37**	**24**	**16**
DRPH		2,000	**570**	**220**	**1,400**
ORPH		2,000	**37**	**520**	**410**
Benzene		0.03	<0.019	<0.023	<0.023
Toluene		7	<0.095	<0.12	**0.041**
Ethylbenzene		6	<0.095	<0.12	<0.12
Xylene, m-,p-		9	<0.38	<0.47	**0.097**
Xylene, o-			<0.19	<0.23	**0.029**
Total Xylenes			<0.57	<0.70	**0.13**

Notes:

[1]Samples analyzed by TestAmerica Laboratories.

[2]Model Toxics Control Act (MTCA) Method A unrestricted cleanup levels.

[3]Depth range shown as feet below existing grade.

mg/kg = milligrams per kilogram; CUL = cleanup level

Bold indicates that the analyte was detected at a concentration greater than the laboratory reporting limit.

SUMMARY AND INTERPRETATIONS

Soil assessment activities conducted by GeoEngineers on October 25, 2018 and May 23, 2019, at the Carnation Dairy site located at 444 West Cataldo Avenue in Spokane, Washington indicated petroleum contaminants at the site are less than the MTCA Method A cleanup levels near the former USTs (Figure 2). Although sampling conducted by others in 1999 indicted petroleum contamination was present at concentrations greater that the MTCA Method A cleanup levels, recent sampling conducted approximately 19 years later in the same general location and depths indicates the contaminants have degraded to concentrations less than the cleanup levels.

Soil boring B-8 was advanced in October 2018 near the 1999 CH2M soil boring SB-2. The soil sample collected from this location in 2018 at the same depth where the 1999 groundwater sample was collected indicted petroleum contamination in soil was less than the MTCA Method A cleanup level. A groundwater sample was not collected during the 2018 investigation because of limited water encountered in the boring. Perched groundwater was present above the underlying bedrock approximately 1½ feet thick (GeoEngineers 2019a) and was likely disturbed and turbid as a result of drilling.

In 1999, a soil sample was not collected, but a grab groundwater sample was collected using a disposable bailer. Water quality parameters were not provided in the report (CH2M 1999b), but our experience with grab groundwater samples collected from temporary borings is that they are generally turbid as a result of suspended sediment. Temporary borings lack a proper filter pack and well screen to keep the subsurface formation from entering the boring and mixing with groundwater. It is possible that sediment in the grab groundwater sample artificially elevated the DRPH concentration in water.

The DRPH concentration in groundwater from boring SB-2 in 1999 was 15,000 micrograms per liter (µg/L) which was greater than the MTCA Method A cleanup level of 500 µg/L. Groundwater from SB-3 did not have detectable concentrations of petroleum contamination, indicating the extents of petroleum contamination were limited at the time. Soil sampling and analysis conducted in 2018 near SB-2 indicted DRPH in soil was less than the cleanup level, but still present at the site. Given the sampling interval of 19 years between the the grab groundwater sample collected in 1999 and the soil sample collected in 2018, it is likely that the petroleum contaminants have degraded.

Degradation of petroleum contaminants over the approximately 19 year period between the two assessment events is further backed given that soil sampling conducted near the former fuel dispenser in 2019 indicted petroleum concentrations had decreased to concentrations less than the MTCA Method A cleanup level when compared to the 1999 sampling efforts (GeoEngineers 2019b).

RECOMMENDATIONS

In our opinion, additional investigation of petroleum contamination in groundwater at the site is not warranted and the site is adequately characterized. Petroleum contamination in soil and groundwater at the site has likely degraded to concentrations less than the MTCA Method A cleanup levels since sampling was conducted in 1999.

The site is suitable for the placement of soil from Riverfront Park which is contaminated with the same contaminants (lead, cadmium and PAHs) from the same former industrial and railroad-related activities. We recommend a No Further Action designation for petroleum contamination from the Washington State

Department of Ecology. If metals and PAH soil is placed at the site, an environmental covenant will be filed for the parcel which identifies the location and extent of known contamination and restricts future site uses that can allow migration or unnecessary exposure to the contaminants. The environmental covenant can also include restrictions on groundwater withdrawal if warranted.

REFERENCES

Cahalan, John C. John C. Cahalan to Phil Leinart, “Re: Former Carnation Dairy Facility Located at 411 West Cataldo Street, Spokane, Washington”, June 22, 1990.

CH2M HILL, Inc. 1999a. “Phase II Environmental Site Assessment Limited Subsurface Exploration, ‘Howard Street Property.’” April 1999.

CH2M HILL, Inc. 1999b. “Focused Subsurface Investigation Report of Findings, ‘Howard Street Property.’” November 1999.

GeoEngineers, Inc. 2019a. “Geotechnical Engineering Evaluation.” GEI File No. 12088-006-03. March 6, 2019.

GeoEngineers, Inc. 2019b. “Carnation Dairy Environmental Assessment.” GEI File No. 0110-148-16. June 20, 2019.

Leinart, Phil. Phil Leinart to John Cahalan, “Re: Contaminated Property at Carnation Dairy, At or Near West 508 Cataldo Avenue, Spokane, Washington”, August 22, 1989.

Leppo Consultants, Inc. 1998. “Phase I Environmental Site Assessment, Mallon Street Property.” November 1998.

Please contact us if you have any questions or comments.

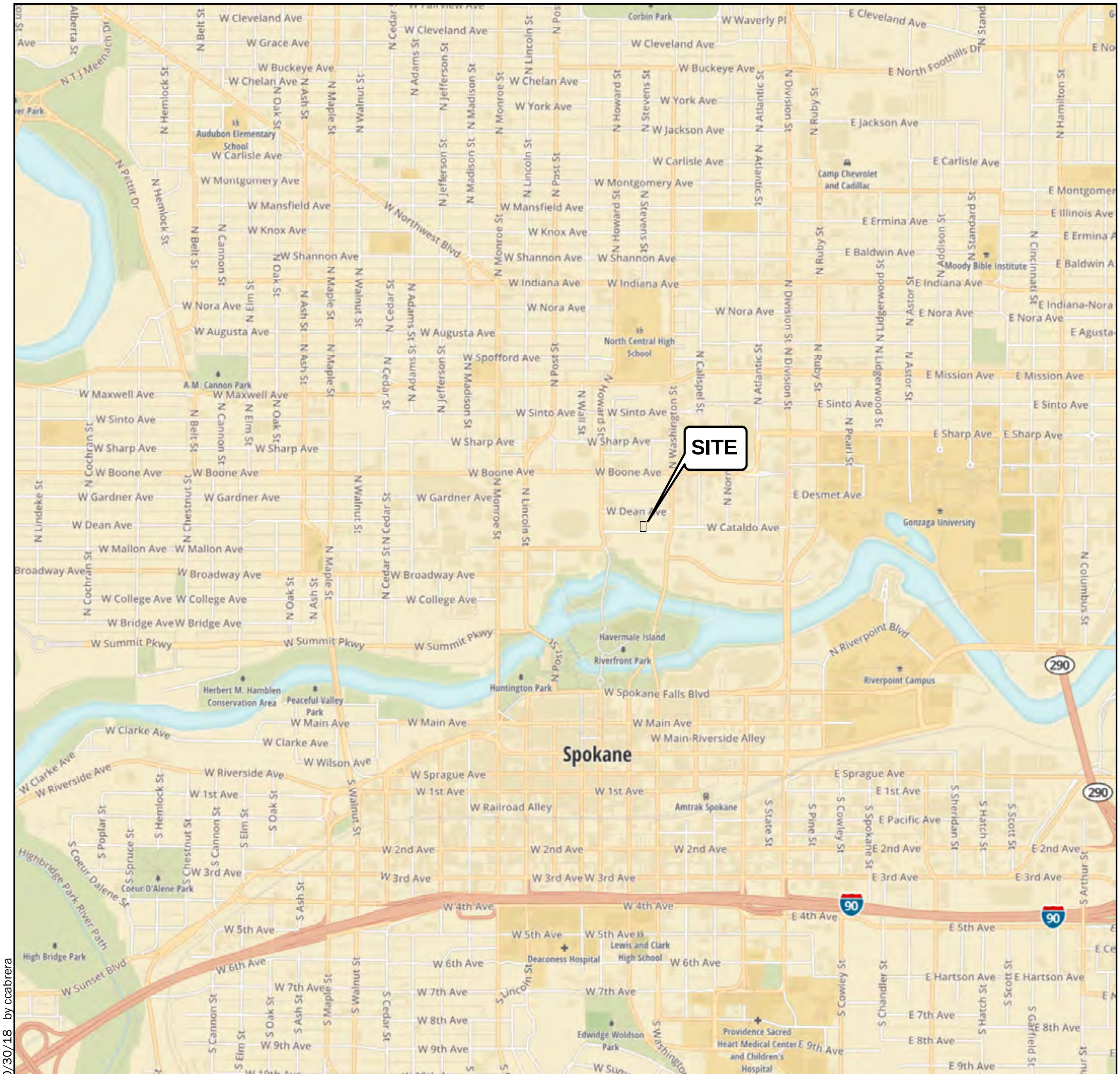
Sincerely,
GeoEngineers, Inc.

Jedidiah R. Sugalski, PE
Environmental Engineer

Bruce D. Williams
Principal

JWR:JRS:BDW:tjh

Attachments:
Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Estimated Depth to Bedrock
Attachment A. Letter from Leinart to Cahalan, 1989
Attachment B. Letter from Cahalan to Leinart, 1990
Attachment C. Phase II ESA, CH2M April 1999
Attachment D. Focused Subsurface Investigation, CH2M November 1999
Attachment E. Sportsplex Geotechnical Engineering Evaluation, GeoEngineers 2019
Attachment F. Carnation Dairy Environmental Assessment, GeoEngineers 2019



N
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2,000 0 2,000

Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2018

Projection: NAD 1983 UTM Zone 11N

Vicinity Map

Carnation Dairy Environmental Assessment
Spokane, Washington

GEOENGINEERS

Figure 1

P:\12\12088006\GIS\MXD\1208800601_F01_VicinityMap.mxd Date Exported: 10/30/18 by ccabrera

Legend

- Approximate Boring Location (GeoEngineers, October 2018)
- Approximate Boring Location (CH2MHill, August 1999)
- Approximate Test Pit Location (GeoEngineers, May 2019)
- Former Dispenser Area
- Former 10,000 gallon diesel UST
- Former 10,000 gallon gasoline UST

60 0 60
Feet

N S E W

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from ESRI,
Parcels from Spokane County, Borings from CH2MHilll and Anania site plans.
Projection: WGS 1984 Web Mercator Auxiliary Sphere

Site Plan

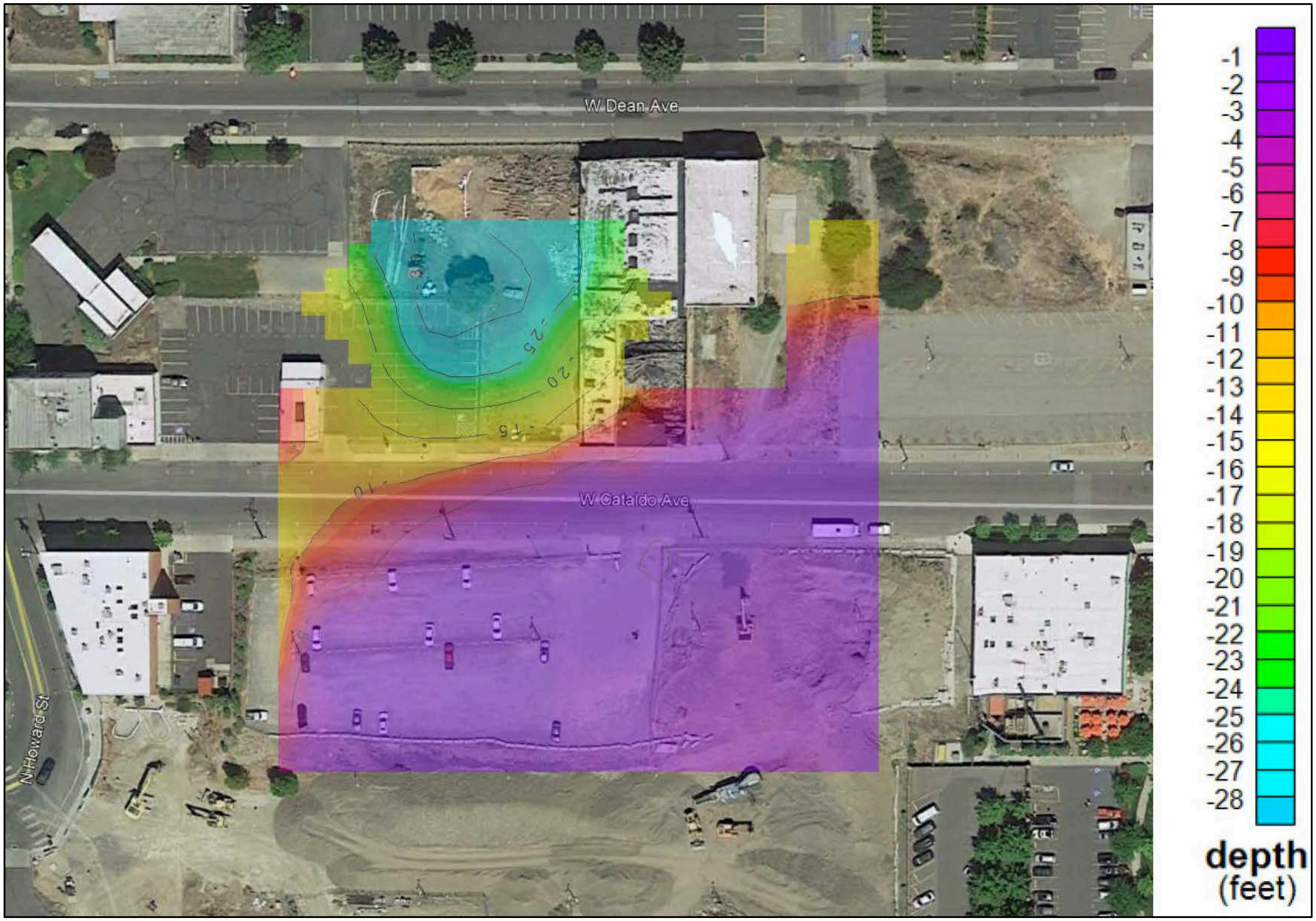
Carnation Dairy Environmental Assessment
Spokane, Washington

GEOENGINEERS

Figure 2

\\geoengineers.com\WAN\Projects\0\0110148\GIS\16\011014816_F02_SitePlan_TPs2019_ZoomedOut.mxd Date Exported: 08/16/19 by lbaldwin

00110-148-16 Date Exported: 08/16/19



Not to Scale

Estimated Depth to Bedrock

Carnation Dairy Environmental Assessment
Spokane, Washington

GEOENGINEERS

Figure 3

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Sage Earth Science Geophysical Survey, Seismic Refraction Survey, November 9, 2018

ATTACHMENT A

Letter from Leinart to Cahalan, 1989

COPY

FILE

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

August 22, 1989

Mr. John Cahalan
Attorney at Law
851 S.W. 6th, Suite 1500
Portland, OR 97204

Re: Contaminated Property at Carnation Dairy, At or Near West 508 Cataldo Avenue, Spokane, Washington

Dear Mr. Cahalan:

This letter is to respond to notification to our office concerning leaky underground storage tanks at the above referenced Carnation Dairy site. The notification was made on August 16, 1989, by Roger Brown, Jr., Anania Geologic Engineering (AGE), Portland, Oregon.

The following will provide guidance on what kind of actions can be taken under the Model Toxics Control Act (MTCA) to ensure the cleanup of sites contaminated with petroleum products. In summary, Ecology may take the following actions:

1. Perform the necessary remedial actions and recover from liable parties the amounts spent by Ecology.

2. Negotiate a settlement agreement with potentially liable parties and the Attorney General's Office, detailing the specific actions to be taken at the site. This agreement would be filed with the Superior Court as a Consent Decree following public notice and hearing. (Ecology is preparing regulations to implement statutory provision for settlement agreements provided by Section 4(4) of the MTCA.)

3. Issue an ORDER requiring potentially liable parties to perform specific remedial actions. Under the authority of Section 5 of the MTCA, Ecology can issue an Administrative ORDER for any phase of remedial action, from the investigatory through the cleanup phase. Or, the potential liable parties can initiate action to negotiate the terms and conditions of a Compliance Order with Ecology. However, at this time, a compliance Order would only be considered for investigatory phases and not cleanup phases. Both types of orders will require public notice.

   All orders and Consent Degrees require a period of public notice and public comment. The liable parties will be required to pay Ecology's oversight costs during the process.

They will also be responsible for meeting the substantive and procedural requirements of all applicable local, state and federal permits.

You may decide to proceed with investigatory and/or cleanup work outside of any of the above referenced formal processes provided by the MTCA. If you decide to take such an approach, please keep in mind that any technical assistance which Ecology might provide would be limited. There is also no guarantee that Ecology will not conduct or require that you conduct further action at the site based on our own evaluation.

Because of your potential liability for the situation at this site, you are advised to carefully document any remedial actions which you may undertake independent of Ecology's involvement. Therefore, it is advisable to obtain the services of a competent engineering or geotechnical firm having experience in the cleanup of sites contaminated with hazardous substances. Remember that you will be responsible for meeting the substantive and procedural requirements of all applicable local, state and federal permits.

We ask that you carefully consider the options available before deciding which one best serves your interests and needs. Should you have any questions, please contact me.

Sincerely,

PML

Phil Leinart
Hazardous Waste Investigations
and Cleanup Program
Waste Management Section

PL:adw

cc: Roger Brown, Jr., P.G.

ATTACHMENT B
Letter from Cahalan to Leinart, 1990

DUNN, CARNEY, ALLEN, HIGGINS & TONGUE

ATTORNEYS AT LAW

851 S. W. SIXTH AVENUE, SUITE 1500
PACIFIC FIRST FEDERAL BUILDING
PORTLAND, OREGON 97204-1357
FACSIMILE (503) 224-7324
TELEPHONE (503) 224-6440

ROBERT L. ALLEN
BRADLEY O. BAKER
JONATHAN A. BENNETT*
ROBERT F. BLACKMORE
JOHN C. CAHALAN
ROBERT R. CARNEY
GEORGE J. COOPER, III
ANDREW S. CRAIG
I. KENNETH DAVIS
MICHAEL J. FRANCIS
BRYAN W. GRUETTER**
JACK D. HOFFMAN
WILLIAM L. KOVACS†
SALLY R. LEISURE
MARSHA MURRAY-LUSBY

NATHAN L. COHEN
JAMES G. SMITH
OF COUNSEL

CENTRAL OREGON OFFICE
709 N.W. WALL STREET, SUITE 103
BEND, OREGON 97701
FACSIMILE (503) 389-6907
TELEPHONE (503) 382-9241

WASHINGTON, D.C. OFFICE
1900 L. STREET, N.W.
SUITE 500
WASHINGTON, D.C. 20036
TELEPHONE (202) 862-4972

ROBERT L. NASH**
GREGORY C. NEWTON**
JEFFREY F. NUDELMAN*
JOAN O'NEILL P.C.*
GILBERT E. PARKER
HELLE RODE
CHARLES D. RUTTAN
JOSEPH P. SHANNON*
G. KENNETH SHIROISHI***
SHANNON I. SKOPIL*
DONALD E. TEMPLETON*
THOMAS H. TONGUE
DANIEL F. VIDAS
ROBERT K. WINGER

* ADMITTED IN OREGON AND WASHINGTON
** ADMITTED IN OREGON AND CALIFORNIA
† ADMITTED IN PENNSYLVANIA, WASHINGTON, D.C., NOT ADMITTED IN OREGON
•• RESIDENT, BEND OFFICE

June 22, 1990

RECEIVED
JUN 25 1990

Phil Leinart, P.G.
Hydrogeologist
Department of Ecology
Eastern Regional Office
N. 4601 Monroe, Suite 100
Spokane, WA 99205-1295

Re: Former Carnation Dairy Facility
Located at 411 West Cataldo Street
Spokane, Washington

Dear Mr. Leinart:

As you know, this office represents Carnation Company on this project. This letter will outline the remaining remediation measures that will be undertaken on behalf of Carnation in regard to the closure and cleanup of the underground storage tank site at the above-referenced facility.

The activities described in this letter were disclosed to you during our meeting at your office on May 31, 1990. During that meeting, you indicated that you had no objection to and would take no action against Carnation if the remediation measures were conducted substantially as we described them to you on that date. We are therefore requesting that you respond with a letter to me confirming your position in that regard.

Background

In August of 1989, Carnation's environmental contractor, AGE, removed two underground storage tanks at the facility. As soon as the tanks were removed, additional excavation was conducted to remove soil that exhibited visible evidence of petroleum contamination. In total, approximately 100 cubic yards of this soil was excavated and stockpiled on site on an inert, visqueen surface.

Drilling operations were subsequently conducted to obtain soil and groundwater samples. There were seven borings in the immediate vicinity of the tank excavation and an additional two borings in the presumed downgradient direction. No groundwater contamination was detected in the resulting tests. Furthermore, out of a total of 51 soil samples, only four samples revealed contamination above the Washington Department of Ecology's 200 ppm/TPH action level for soil remediation. Copies of the test results are enclosed for your review.

Remediation Plans

1. The Soil in the Ground. During our meeting on May 31,1990, I expressed the view that the soil sample results did not warrant any further excavation for purposes of remediating the soil that remains in the ground. I based my position on the following considerations:

> 1. the source of the contamination was eliminated when the tanks were removed;
>
> 2. the most seriously contaminated soil was removed following the tank removal;
>
> 3. the remaining contamination is comparatively minor;
>
> 4. natural degradation will eventually bring the contaminated soils below current action levels;
>
> 5. the absence of groundwater contamination removes any likelihood of harm to the public welfare or the environment.

In addition to these considerations, our drilling contractor has advised that any further excavation would be dangerous from a structural perspective. For all of these reasons, it is our position that it would not be appropriate to perform further excavation and that any future remediation measures should be confined to the previously excavated soil that remains stockpiled at the site.

2. The Excavated Soil. The stockpiled soil has been tested for total petroleum hydrocarbons and volatile organics. These tests reveal that the contamination has been reduced to a

level below 500 ppm TPH. Consequently, the Spokane County Air Pollution Control Authority will allow this soil to be remediated by vaporization on-site without requiring additional protective measures, such as a carbon granule overlay. We presented these findings to the County's representative, who advised that our "land-farming" proposal meets with his approval Therefore, we intend to have the above-ground soil remediated in this fashion until it falls below DOE's 200 ppm action level.

Conclusions

In light of the above, I have advised Carnation to proceed to remediate the stockpiled soil without performing any further excavation or remediation relative to the soils that remain in the ground. I would be grateful if you would send us a reply letter stating that you have no objection to the remediation plans described in this letter. To facilitate your response, a stamped, self-addressed envelope is enclosed.

Thank you very much for your cooperation and guidance. We will provide you with a final closure report when the work is completed.

Very truly yours,

John C. Cahalan

John C. Cahalan

JCC:dja
(12745)
Enclosures
cc: Carnation Company
Attn: Malcolm Ewing
AGE
Attn: James Wallace

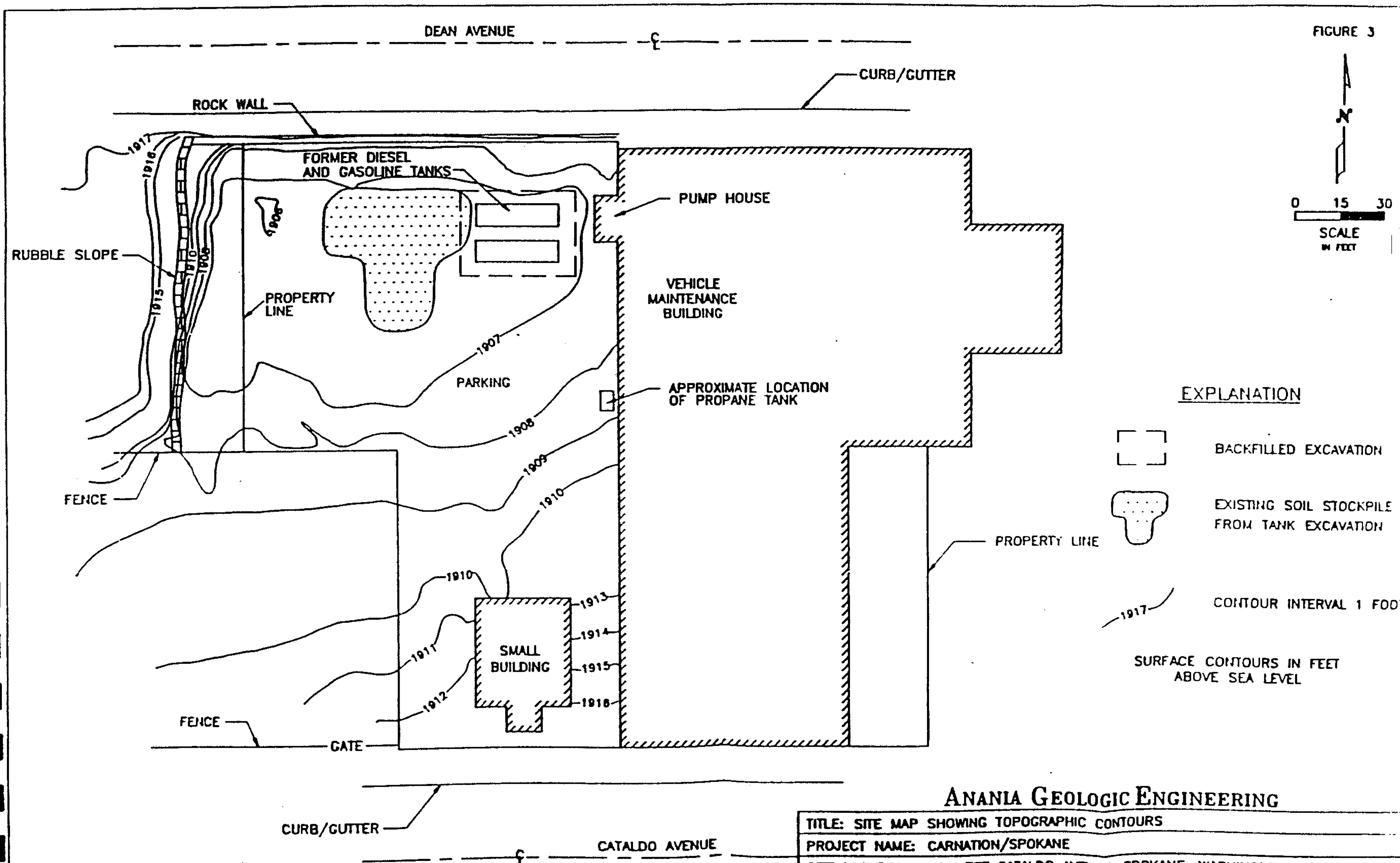
Table 1: Underground Storage Tank Specifications

Gasoline Storage Tank

Nominal Capacity:	10,000 gallons
Stored Product:	gasoline
Diameter:	96 inches
Length:	28 feet
Burial Depth:	40 inches
Estimated Age:	>20 years

Diesel Storage Tank

Nominal Capacity:	10,000 gallons
Stored Product:	diesel
Diameter:	91 inches
Length:	30.5 feet
Burial Depth:	40 inches
Estimated Age:	>20 years



ANANIA GEOLOGIC ENGINEERING

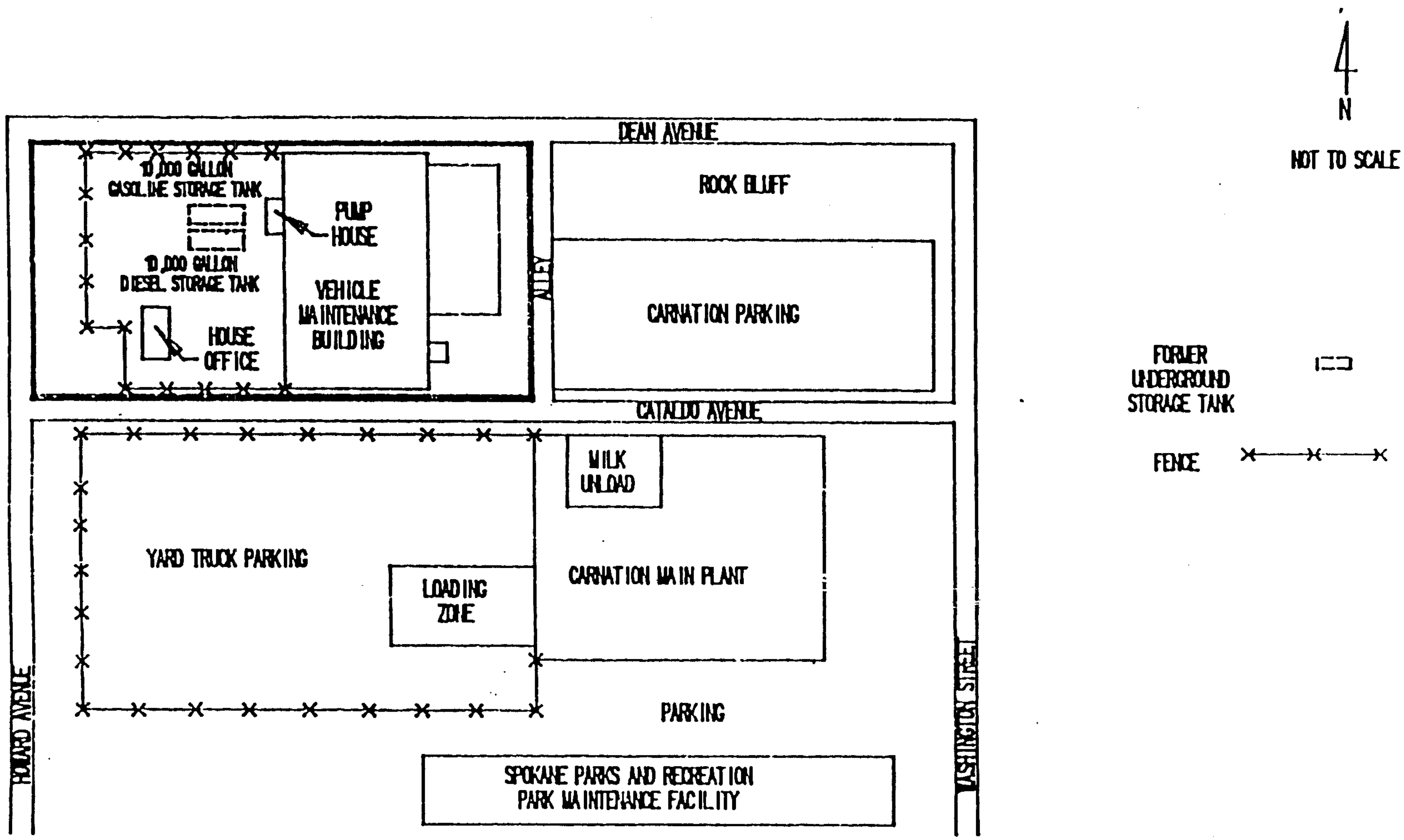
TITLE: SITE MAP SHOWING TOPOGRAPHIC CONTOURS

PROJECT NAME: CARNATION/SPOKANE

SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON

DATE: 4/24/90	DRAWING NO.: 080-002	SCALE: 1"=30'	PROJECT NO.: 004-89-080

FIGURE 2

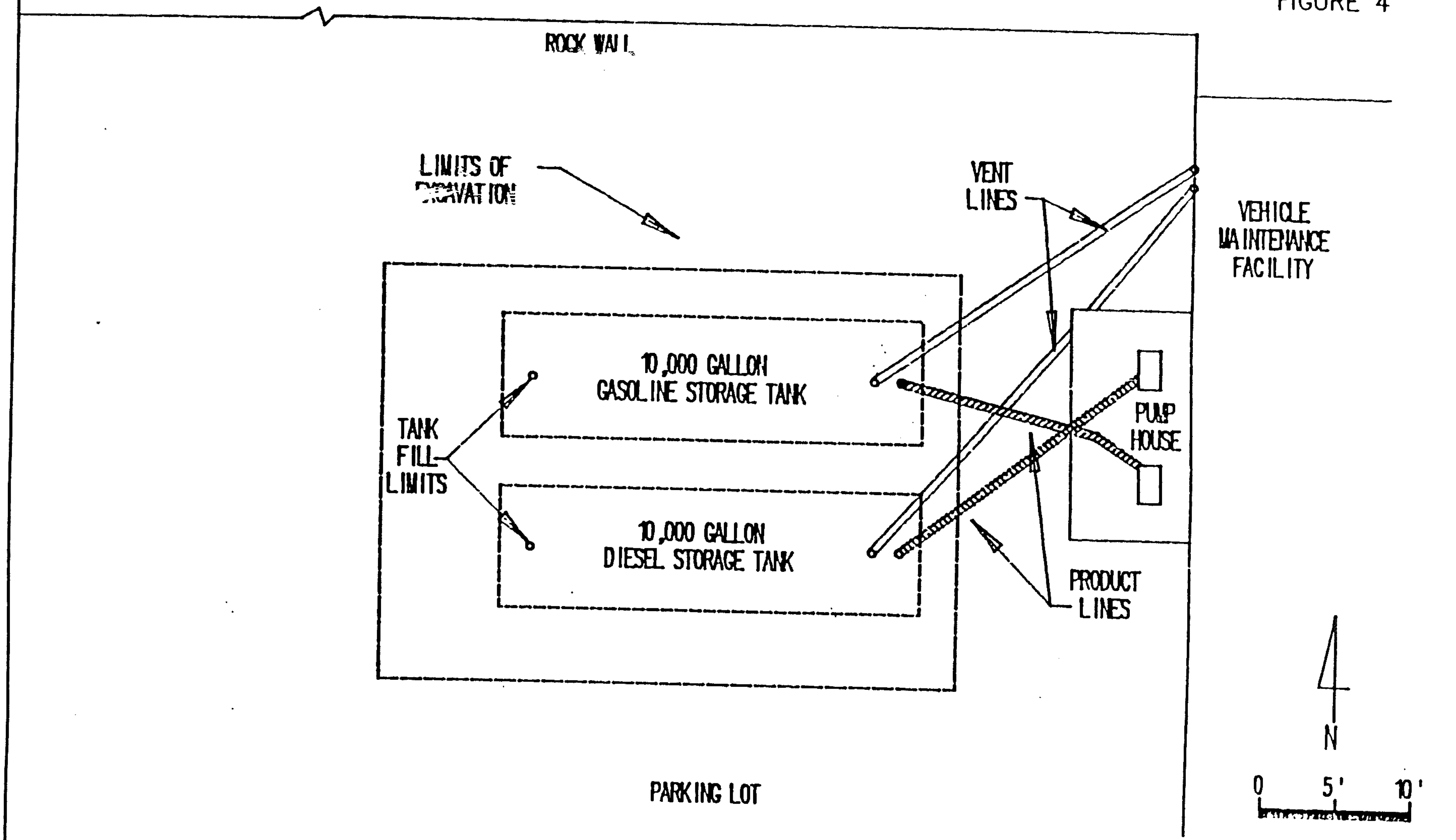


REFERENCE: "Preliminary Environmental Site Assesment Carnation Dairy Facilities Portland, Oregon and Spokane, Seattle, Aberdeen and Bremerton, Washington"
Hart Crowser Company
1989

ANANIA GEOLOGIC ENGINEERING

TITLE: FACILITY LAYOUT			
PROJECT NAME:	CARNATION FOREMOST DAIRIES	PROJECT NO:	004-89-080
SITE LOCATION:	407-413 CATALDO AVENUE, SPOKANE, WASHINGTON		
DATE: 4/24/90	DRAWING NO.: 080-008	SCALE:	NOT TO SCALE

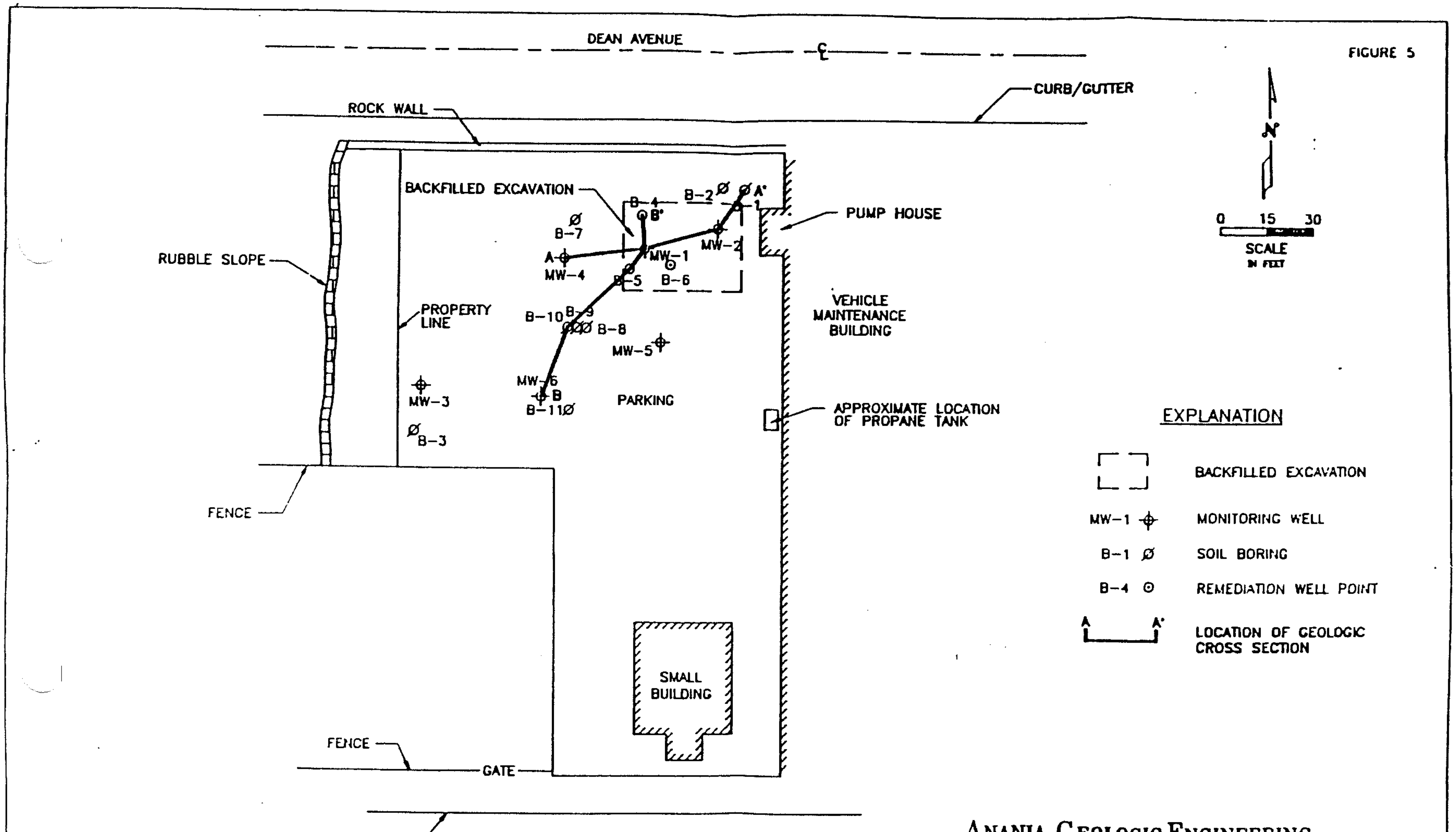
FIGURE 4



Note: Locations not surveyed

ANANIA GEOLOGIC ENGINEERING

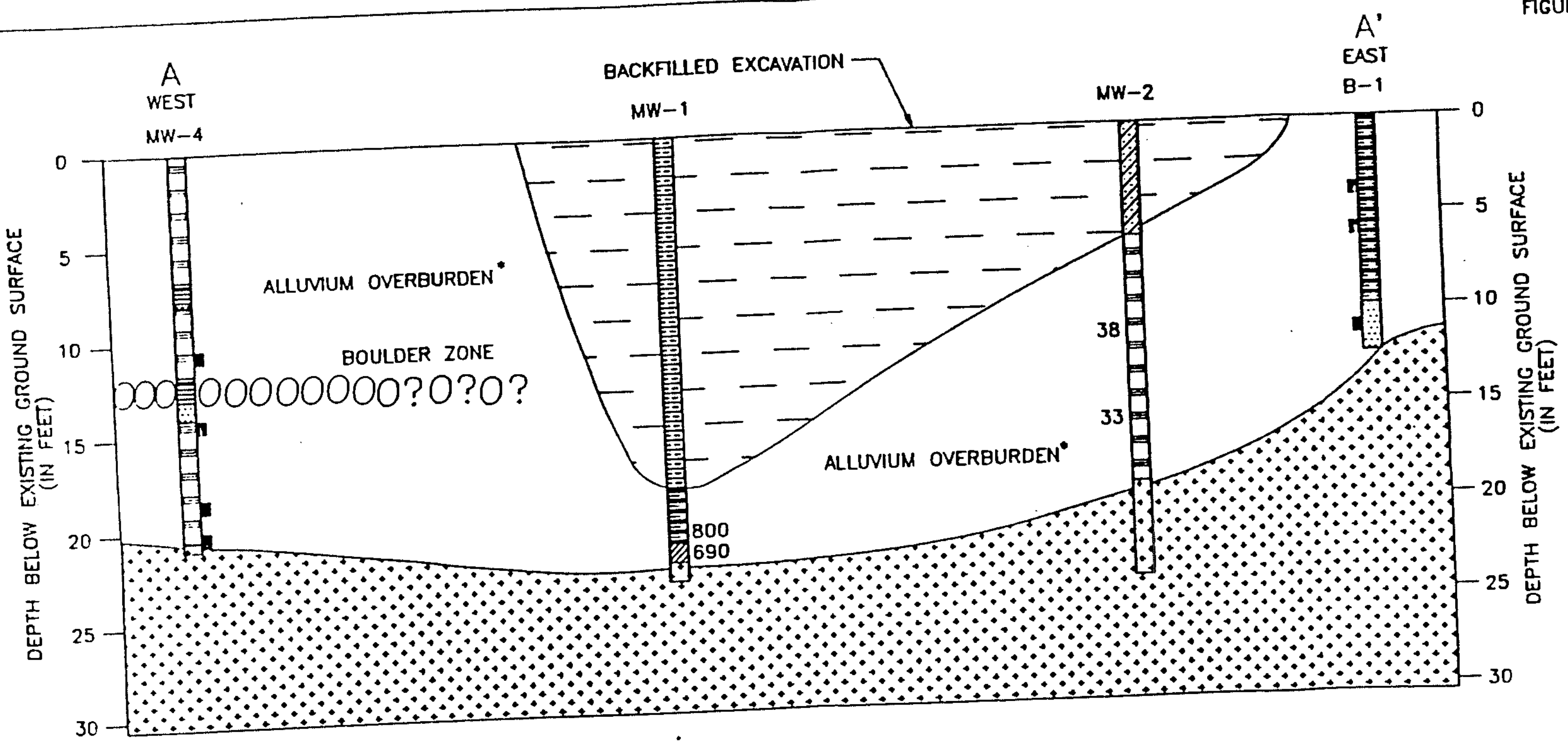
TITLE: UNDERGROUND STORAGE TANK AND PIPING LOCATIONS			
PROJECT NAME: CARNATION FOREMOST DAIRIES		PROJECT NO: 004-89-080	
SITE LOCATION: 407-413 CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-002	SCALE: 1" = 10'	



ANANIA GEOLOGIC ENGINEERING

TITLE: BORING-WELL LOCATIONS AND LOCATIONS OF CROSS SECTIONS			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-008	SCALE: 1"=30'	PROJECT NO.: 004-89-080

FIGURE 7



EXPLANATION

BASALT

SILTY SANDS

GRAVELLY OR SANDY CLAYS

CLAYEY SANDS

POORLY GRADED GRAVEL SAND SILT MIXTURES

POORLY GRADED GRAVEL SAND MIXTURES

WELL GRADED GRAVEL SAND MIXTURES

PEA GRAVEL BACKFILL

800 TOTAL PETROLEUM HYDROCARBONS (TPH) CONCENTRATION (ppm) BASED ON EPA METHOD 418.1

■ CONSTITUENTS NOT DETECTED AT OR ABOVE DETECTION LIMITS

? UNEXPLORED AREA

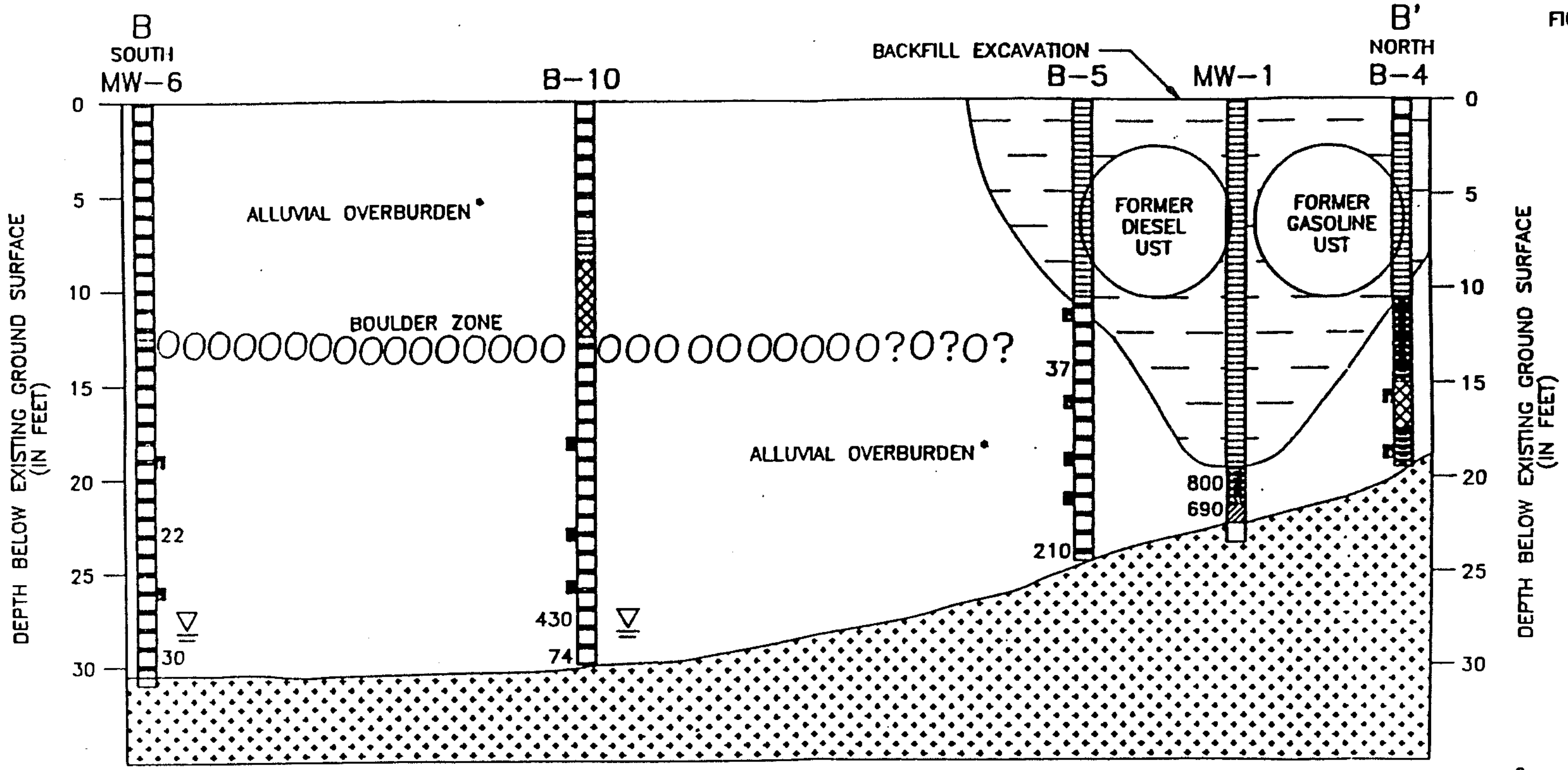
*REFER TO BORINGS FOR DETAILED LITHOLOGY

SCALE IN FEET: 0 – 6

ANANIA GEOLOGIC ENGINEERING

TITLE: CROSS SECTION A-A'			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-005	SCALE: 1" = 6'	PROJECT NO.: 004-89-080

FIGURE 8



EXPLANATION

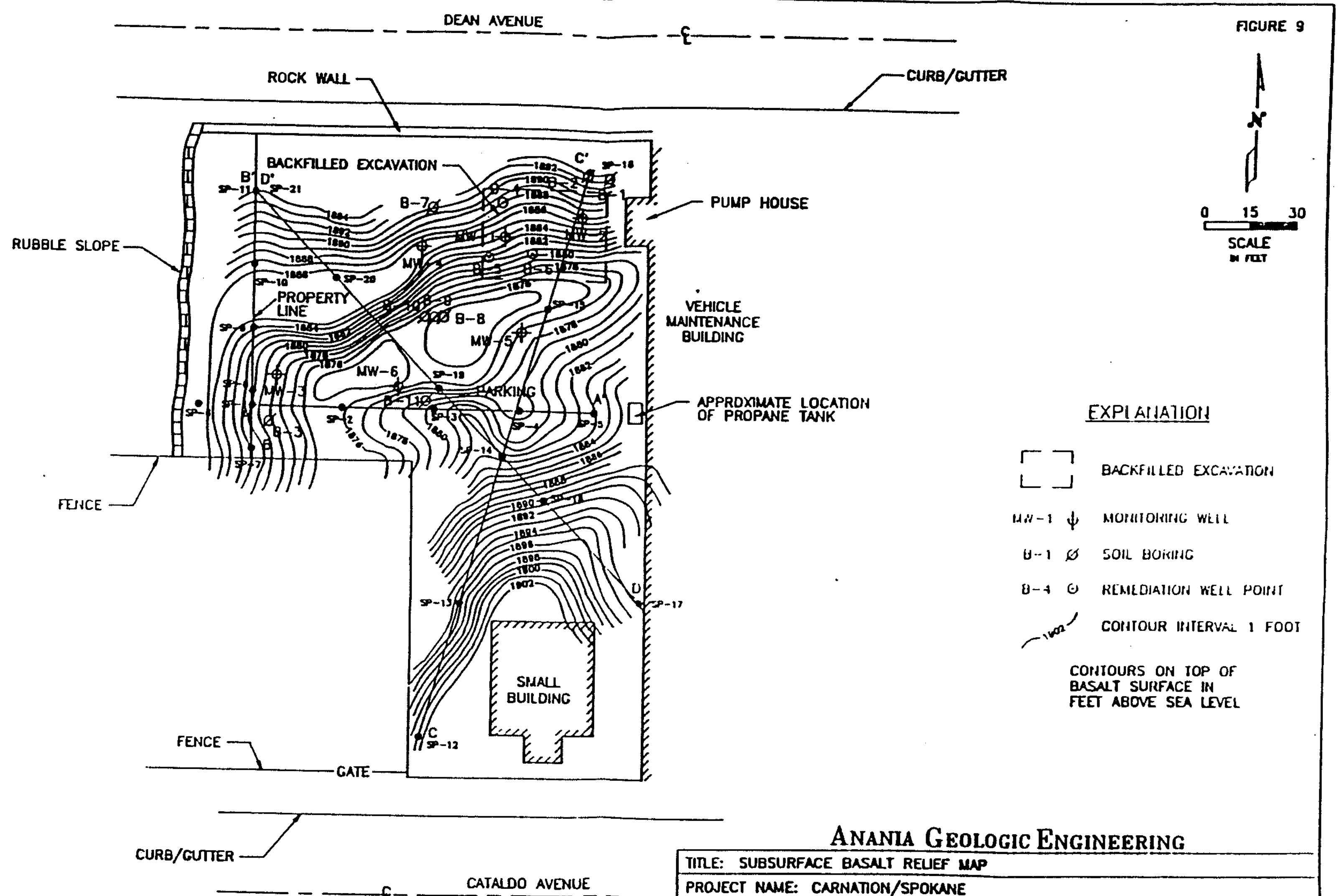
BASALT	POORLY GRADED GRAVEL SAND SILT MIXTURES	210 TOTAL PETROLEUM HYDROCARBONS (TPH) CONCENTRATION (ppm) BASED ON EPA METHOD 418.1
SILTY SANDS	POORLY GRADED GRAVEL SAND MIXTURES	■ CONSTITUENTS NOT DETECTED AT OR ABOVE DETECTION LIMITS
GRAVELLY OR SANDY CLAYS	WELL GRADED GRAVEL SAND MIXTURES	▽ FIRST ENCOUNTERED GROUNDWATER
CLAYEY SANDS	PEA GRAVEL BACKFILL	? UNEXPLORED AREA
GRAVELLY SAND		

*REFER TO BORINGS FOR DETAILED LITHOLOGY

SCALE IN FEET: 0 – 6

ANANIA GEOLOGIC ENGINEERING

TITLE: CROSS SECTION B-B'			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-006	SCALE: 1"=6'	PROJECT NO.: 004-89-080



ANANIA GEOLOGIC ENGINEERING

TITLE: SUBSURFACE BASALT RELIEF MAP			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-007	SCALE: 1"=30'	PROJECT NO.: 004-89-080

ATTACHMENT C
Phase II ESA, CH2M April 1999

Report of Findings

Phase II
Environmental Site Assessment
Limited Subsurface Exploration
"Howard Street Property"

Submitted to

City of Spokane

April 1999

CH2MHILL

Contents

Executive Summary

Purpose

The City of Spokane Parks Department (The City) retained Perron Collaborative as prime consultant and CH2M HILL, Inc. as subconsultant to conduct a Phase II Environmental Site Assessment to (ESA) further assess areas of potential environmental liability identified in the *Phase I Environmental Site Assessment—Mallon Street Property (North Bank Master Plan)*, prepared by Leppo Consultants, Inc., November 1998 under subcontract to CH2M HILL. This Phase II Environmental Site Assessment was conducted for several adjacent parcels, referred to collectively as the "Howard Street Properties," a subarea of the Phase I Environmental Site Assessment area. The information gathered during this assessment was intended to assist The City in purchase considerations for the approximately 299,000-square-foot area referred to as parcels number four and seven of the Howard Street Property, excluding existing City streets and right of ways.

Special Terms and Conditions

This assessment is a business decision tool prepared exclusively for the City of Spokane. It is not a full characterization of the site's environmental conditions, as the investigation was limited to the buildings and above ground improvements and the shallow subsurface soils above the basalt bedrock surface. Evaluation of groundwater was not included in this assessment as no groundwater was encountered above the basalt bedrock.

No warranty, express or implied, is made. There are no beneficiaries of the work products other than The City, and no other person or entity is entitled to rely upon the work products without the written consent of CH2M HILL.

Site Description

The Howard Street Properties, herein referred to as the site, is currently a private commercial property that lies north and south of Cataldo Street between Washington Street and Howard Street. It is located in the Southwest Quarter of the Northeast Quarter of Section 18, Township 25 North, Range 43 East (W.M.) in Spokane County, Washington. A vicinity map is provided as Figure 1. The greater surrounding land uses include commercial businesses, roadways, city parks, and public structures.

The site is in an area of moderate sloping terrain with localized areas of steeper gradient to the site topography. In general, the site topography slopes to the south, towards the north bank of the Spokane River. The site has undergone development modifications to the surface topography over the last 100-plus years, using imported fill materials to level steeper gradients. Historical site development includes both the construction and demolition of commercial and residential buildings and the former presence of a major, east-to-west railroad right-of-way (R/W) serving commercial/industrial land use on the

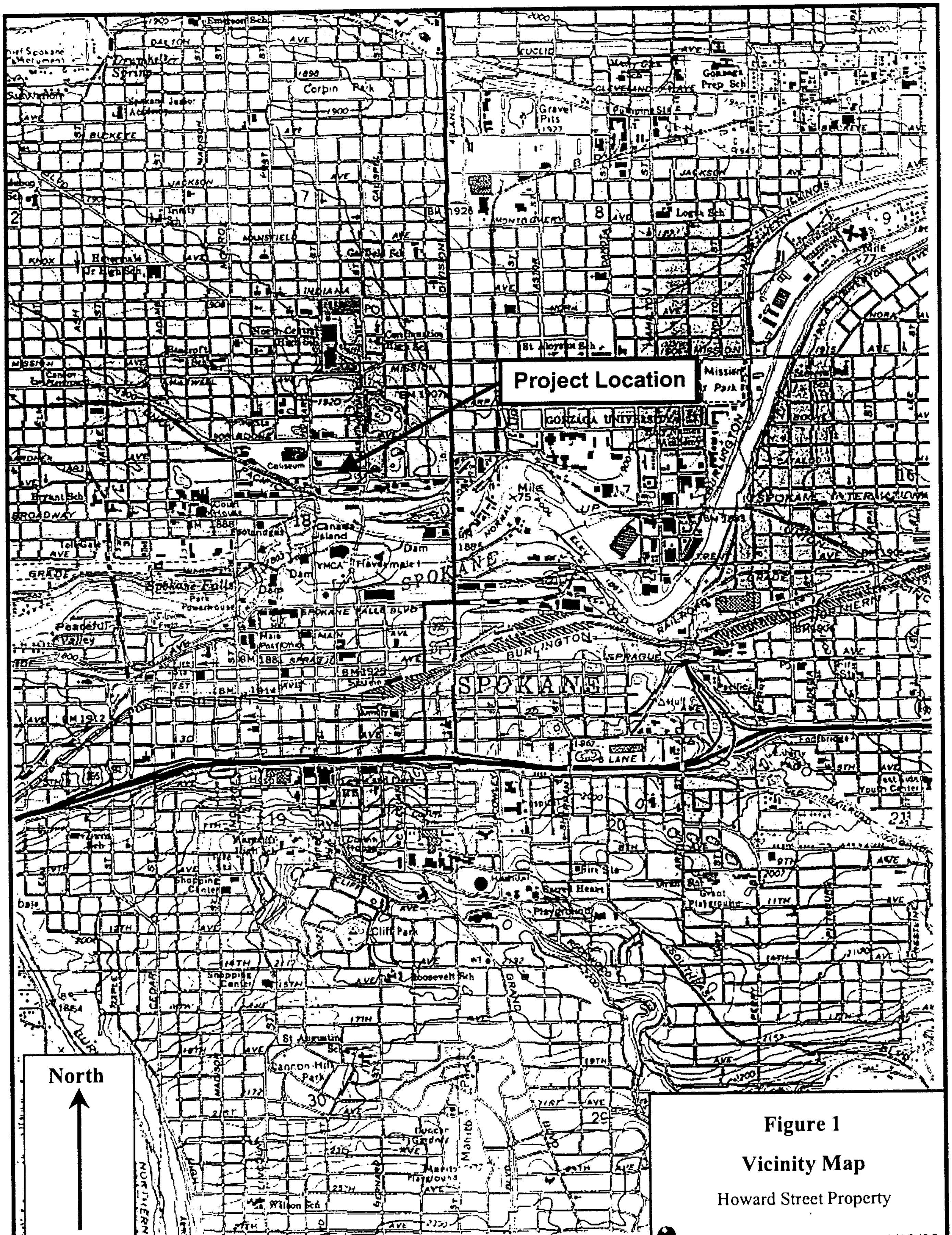


Figure 1

Vicinity Map

Howard Street Property

CH2MHILL

4/13/99

north bank of the Spokane River. The riverbed lies approximately 40 feet below the site in elevation. The average site elevation is approximately 1,900 feet national geodetic vertical datum (NGVD) (1929).

Local geologic maps report the site as immediately underlain by Pleistocene-age glacial flood deposits. These medium- to coarse-textured materials include a poorly sorted, stratified mixture of boulders, cobbles, gravels, and sand. Basalt bedrock, belonging to the Miocene-age Columbia River Group, underlies the site and outcrops are visible. The site is located within the Spokane Aquifer Sensitive Area (ASA) of the Spokane Aquifer, but not within the Spokane Aquifer Boundary. Soils in the area are in the Hesseltine silt loam unit (Soil Conservation Service). The Hesseltine silt loam consists of well-drained, medium-textured soils underlain by sand, gravel, and cobblestones. Based on visual observation of subsurface explorations done for this report, site soils appear to be imported backfill of variable composition, composed primarily of sand to gravel sized rock fragments.

Site History and Land Use

Property 4—Goodale & Barbieri (Inland Northwest Corporation) consists of two separate parcels, with an unimproved lot along West Dean Avenue. The second area consists of a parcel beyond the south side of West Cataldo Avenue. Property 7—Inland Northwest Dairies, Inc. consists of three separate properties. This property is occupied by the Carnation Garage, and also formerly with an office building. The second building associated with Property 7 is the Broadway Dairy.

Supplemental Records Review

In addition to aerial photographs reviewed for the Phase I ESA report, several aerial photographs were reviewed to understand site improvements and activities over the active life of the properties. The dairy, garage and garage offices are visible in the photos since 1940. In addition, utility records were reviewed for sewer and other piping connections to the properties.

Field Explorations and Findings

An initial visual inspection of the site was conducted on March 2, 1999. Test pit and sampling locations and depths were selected and marked based on the Phase I ESA report and the observations collected during the visual inspection.

The test pit and soil sampling locations were selected to provide assessment information regarding the presence or absence of suspect impacted soils in the project area. Twelve sampling locations were selected for test pits.

The subsurface exploration and soil sampling program was initiated and completed on March 4, 1999. Eleven exploratory test pits were completed in the subject site with the collection of a total of 17 soil samples.

An inventory of chemical containers on the site and possible contents for waste management purposes was also done.

A visual observation of the site buildings was conducted to identify suspected asbestos containing materials (ACM). The subject buildings consisted of the Dairy Garage, former Dairy Garage Office, and the dairy processing facility. The observation did not include destructive sampling of building materials and bulk sample analysis matrix but only visual observations, which provided a professional opinion of the potential for ACM.

Results

In general, the test pits indicated a shallow depth to bedrock of 2 feet to 8 feet in the dairy processing area and 4 to 8 feet in the railroad yard area.

The Dairy Garage Area has two separate environmental items of consideration, the west side and the east side, both of which are considered to extend beneath the existing structure. A test pit excavated on the west side of the dairy garage building encountered elevated lead concentrations at approximately 10 feet below ground surface (bgs). The lead concentration was above both MTCA Method A cleanup levels for general and industrial soils. Further assessment will be needed to determine whether soil concentrations exceed federal waste limits (RCRA) and the nature and extent of the release in this area.

A test pit excavated on the east side of the dairy garage building, in the area of the former fuel dispensers, encountered elevated petroleum hydrocarbon soil concentrations above the MTCA Method A cleanup levels for general and industrial soils.

Test pits conducted in the Railroad Yard Area and throughout the Mallon Street Property resulted in soil samples near or exceeding the MTCA Method A cleanup levels for soil, but not for industrial soil. These samples appear to represent the general characteristics of the backfill material throughout the Mallon Street Property.

An inventory of suspected asbestos containing materials (SACM) indicated that SACM exists.

1.0 Introduction

1.1 Purpose

The City of Spokane Parks Department (The City) retained Perron Collaborative as prime consultant and CH2M HILL, Inc. as subconsultant to conduct a Phase II Environmental Site Assessment to (ESA) further assess areas of potential environmental liability identified in the *Phase I Environmental Site Assessment—Mallon Street Property (North Bank Master Plan)*, prepared by Leppo Consultants, Inc., November 1998 under subcontract to CH2M HILL. This Phase II Environmental Site Assessment was conducted for several adjacent parcels, referred to collectively as the "Howard Street Properties," a subarea of the Phase I Environmental Site Assessment area. The information gathered during this assessment was intended to assist The City in purchase considerations for the approximately 299,000-square-foot area referred to as parcels number 4 and 7 of the Howard Street Property, excluding existing City streets and right of ways.

1.2 Special Terms and Conditions

This assessment is a business decision tool prepared exclusively for the City of Spokane. It is not a full characterization of the site's environmental conditions, as the investigation was limited to the buildings and above ground improvements and the shallow subsurface soils. Evaluation of groundwater was not included in this assessment as no groundwater was encountered above the basalt bedrock. The investigation was limited to soils and did not extend beyond the basalt bedrock surface.

No warranty, expressed or implied, is made. There are no beneficiaries of the work products other than The City, and no other person or entity is entitled to rely upon the work products without the written consent of CH2M HILL.

Identification of parties potentially responsible for the cleanup of hazardous substance releases was not attempted.

This assessment was based, in part, on unverified preliminary information supplied to CH2M HILL and it's subconsultant, Leppo Consultants Inc. from several sources during the Phase I ESA. Therefore, CH2M HILL cannot guarantee completeness or accuracy of the Phase I ESA and those portions of the assessment that relied on the Phase I ESA. In addition, the Phase I ESA and the Phase II ESA were prepared within recognized schedule and budget constraints of the City.

The CH2M HILL personnel who performed the site assessment are not attorneys. Therefore this report is not a legal representation or interpretation of environmental laws, rules, regulations, or policies of local, state, or federal governmental agencies.

The information presented herein applies to site conditions existing when services were performed. CH2M HILL cannot report on, or accurately predict events that may change the site conditions after the described services were performed, whether occurring naturally or caused by external forces.

CH2M HILL's scope of services did not include directly or indirectly storing, arranging for or actually transporting, disposing, treating or monitoring hazardous substances, hazardous materials, hazardous wastes or hazardous oils.

1.3 Limiting Conditions and Methodologies Used

The purpose of this preliminary Phase II Environmental Assessment was to identify the presence or absence of total petroleum hydrocarbons (TPH, including gasoline, diesel, and heavy oil ranges), total metals (As, Ba, Ca, Cr, Pb, Hg, Se, and Ag), polychlorinated biphenyls (PCBs), and semi-volatile organic compound (Semi-VOCs) or polynuclear aromatic compound (PAHs) contaminants in soils potentially originating from spills and releases at the site. The work was performed in accordance with the ASTM Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process, designation E 1903-97. The presence or absence of contaminants was determined from samples collected at locations most likely to yield contaminants, based on the Phase I ESA and visual field observations. The Phase II ESA also included visual inspection of suspected asbestos containing materials, but did not include sampling and laboratory analysis.

Schedule, budget and the inherent limitations of subsurface explorations were such that the Phase II ESA could not identify and sample locations with the highest levels or greatest extent of contamination. Samples collected only indicate the presence or absence of suspected contaminants within the discrete locations explored and do not indicate absolute levels of contamination.

2.0 Background

2.1 Site Description

The Howard Street Properties, herein referred to as the site, is currently a private commercial property that lies north and south of Cataldo Street between Washington Street and Howard Street. It is located in the Southwest Quarter of the Northeast Quarter of Section 18, Township 25 North, Range 43 East (W.M.) in Spokane County, Washington. A vicinity map is provided as Figure 1. The greater surrounding land uses include commercial businesses, roadways, city parks, and public structures.

The site is in an area of moderate sloping terrain with localized areas of steeper gradient to the site topography. In general, the site topography slopes to the south, towards the north bank of the Spokane River. The site has undergone development modifications to the surface topography over the last 100-plus years, using imported fill materials to level steeper gradients. Historical site development includes both the construction and demolition of commercial and residential buildings and the former presence of a major, east-to-west railroad right-of-way (R/W) serving commercial/industrial land use on the north bank of the Spokane River. The river bed lies approximately 40 feet below the site in elevation. The average site elevation is approximately 1,900 feet NGVD (1929).

Local geologic maps report the site as immediately underlain by Pleistocene-age glacial flood deposits. These medium to coarse textured materials include a poorly sorted, stratified mixture of boulders, cobbles, gravels, and sand resulting from multiple episodes of catastrophic outbursts from glacial-dammed lakes northeast of the area (DNR Geologic Map GM-39, 1991). Basalt bedrock, belonging to the Miocene-age Columbia River Group, underlies the site and outcrops are visible. In general, the basalt flows are several hundred feet thick in this area. No surface water bodies, wetland-type conditions, or similar sensitive environments were observed on the site or on adjacent properties (aside from the Spokane River and its floodplain).

The site is located within the Spokane Aquifer Sensitive Area (ASA) of the Spokane Aquifer, but not within the Spokane Aquifer Boundary (U.S.G.S. Water Supply Paper No. 2265, 1987). Direct recharge to the unconfined aquifer is not reported as underlying the site due to the presence of basalt bedrock subcrops in this general area.

According to the 1968 Soil Survey of Spokane County, Washington, prepared by the USDA Soil Conservation Service, the soils in the area are in the Hesseltine silt loam unit. The Hesseltine silt loam consists of well-drained, medium-textured soils underlain by sand, gravel, and cobblestones. These soils are formed in glacial outwash mixed with volcanic ash and loess. In the site area, soils observed appear to be imported backfill of variable composition, composed primarily of sand to gravel sized rock fragments.

2.2 Site History and Land Use

Property identifications are taken from the Phase I Environmental Site Assessment (ESA).

Property 4 - Goodale & Barbieri (Inland Northwest Corporation) consists of two separate parcels, with an unimproved lot located in parcel number 35181.4208 along West Dean Ave (Figure 2). The second area consists of parcel number 35181.0032 beyond the south side of West Cataldo Ave. This parking area is accessed from North Howard Street to the west. No historical records were available for review.

Property 7 - Inland Northwest Dairies, Inc. consists of three separate properties on the north and south sides of West Cataldo Ave. Ten parcels are noted. The property on the north side of Cataldo is comprised of parcel numbers 35181.4206 and 35181.4207 and has an address of 444 and 508 West Cataldo Avenue. This property is occupied by the Carnation Garage (444 West Cataldo Ave.), and also formerly with an office building (no longer present at 508 West Cataldo Avenue). The garage was built in 1914 and has approximately 15,000 square feet on the first floor, with a full basement. The garage structure is constructed from brick and has a flat tar and gravel roof. Heat is provided by a pressure oil burner and central steam, according to field records. The garage has a main entrance on Cataldo Ave, however a large bay door is also located in Dean Ave.

The second building associated with Property 7 is the Broadview Dairy located at 411 West Cataldo Ave. on the southwest corner of West Cataldo Ave. and North Washington St. This facility consists of several attached brick buildings on parcel numbers 35181.4402, 35181.4406, and 35181.4408. Field records indicate that this three story brick building was originally built in 1907. An elevator was installed in 1982 and offices are listed on the third floor. The main use of the buildings is indicated as a dairy processing facility. Information on a heat source was not available. The third property consists of parcels 35181.4202, -.4203, - .4224, -.4224, -.4225, and -.4226. It appears as an unimproved property, used for parking.

2.3 Previous Assessments

As noted above, a limited Phase I ESA was performed on approximately 23 acres of property which included the subject site. Requests were made of the property owner, Inland Northwest Dairies, for copies of previous assessments that may have done on the property. Inland Northwest Dairies indicated that at least one underground storage tank (UST) had been removed in the early 1990's but no other environmental assessment documentation was available.

A review of the Washington State Department of Ecology records conducted as part of the Phase I investigation found a correspondence from Dunn, Carney, Allen, Higgins & Tongue, Attorneys at Law, representing the Carnation Company, addressed to the Department of Ecology dated June 22, 1990. This correspondence summarized the excavation, removal, and subsurface sampling conducted as part of an underground fuel tank removal conducted at the former Carnation garage site, in the parking area west of the existing building. The correspondence included six attachments, figures constructed by Anania Geologic Engineering, showing the tank locations, excavation area, subsurface soil borings, and subsurface cross sections in the area of the excavation with soil analytical results. The

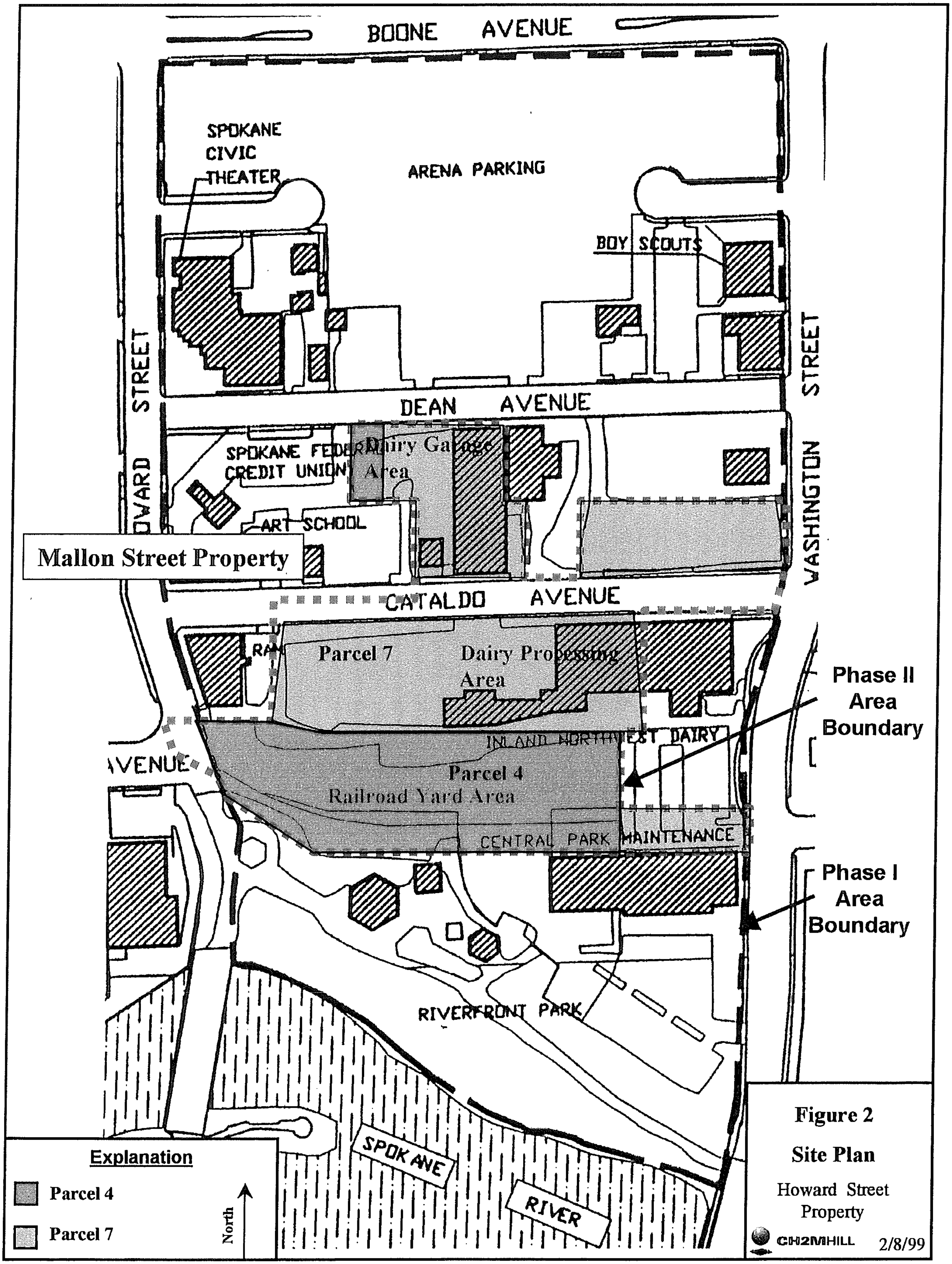


Figure 2

Site Plan

Howard Street Property

CH2MHILL 2/8/99

attachments indicated the presence of two (2) 10,000 gallon storage tanks, one gasoline and one diesel, located west of the Vehicle Maintenance Building (Dairy Garage).

The correspondence appeared to be in response to a letter submitted by the Department of Ecology to Dunn, Carney, Allen, Higgins & Tongue regarding a notification of leaking underground storage tanks made by Anania Geologic Engineering, dated August 22, 1989.

No further documentation regarding the remedial actions conducted at the site, or disposal of soil spoils generated during the excavation, were found in the Department of Ecology's records. A copy of the file review has been included as Appendix A of this report.

3.0 Phase II Activities

3.1 Supplemental Records Review

3.1.1 Aerial Photograph Documentation

The Spokane County Engineering Department and the USDA Natural Resource Conservation Service maintains a library of limited aerial photography available for public review. In addition, private historical aerial photographs were reviewed from the non-catalogued aerial collection at Libby's Photographs of Spokane, Washington. Aerial photographs of the Subject Site were visually examined for evidence of land use changes and potential recognized environmental conditions. The following are discussions from reviewed aerial photographs.

1940—This black and white oblique photograph is at an approximate scale of 1 inch to 400 feet. The southern portion of the property is visible with the railroad R/W, including tracks and trains (all or portions of Property 4, 7, and 14. The Broadview Dairy (formerly Carnation Company at Property 7) processing facility, garage (two attached buildings) and garage office (possibly a former residence) is visible on the north and south sides of West Cataldo Ave.). A third building along West Dean Ave. is attached to the northeast corner of the garage buildings, but is not clear if this is part of the dairy.

1950—This black and white vertical photograph is at an approximate scale of 1 inch to 1,320 feet. The railroad right-of-way (R/W), including tracks (portions of Property 4 and 7). Markings on the photograph indicate the railroad R/W as the Great Northern Railway. The Dairy Garage and office buildings can be identified, which appears to have unpaved lots to the north, east, and west of the buildings. The Broadview Dairy (formerly Carnation Company at Property 7) Processing (Main Dairy) building can also be identified, which has an unpaved parking lot west of the building.

1957—This black and white vertical photograph is at an approximate scale of 1 inch to 1,666 feet. The railroad R/W can be identified, which appear with approximately 15 to 20 parked rail cars. The Dairy Garage, Office and Processing buildings appear similar to the 1950 photograph. Truck trailers can be identified in the parking area west of the Dairy Processing building.

1962—This black and white vertical photograph is at an approximate scale of 1 inch to 175 feet. A majority of the subject site appears similar to the 1957 view. The pump shed can be identified on the northwest corner of the Dairy Garage with several possible truck trailers parked in the unpaved lot west of the building. The Garage Office building appears immediately west of the garage and has two vehicles parked in the northern portion of the building. The Dairy Processing Building can be identified, which has a parking area west of the building. Approximately 25 to 30 vehicles and 8 truck trailers are parked in the lot area. The western portion of the Processing building area appears to have a loading dock, as three trucks are parked at right angles to the building.

1986—This black and white vertical photograph is at an approximate scale of 1 inch to 400 feet. The photograph is not clear, making interpretation difficult. Few major changes are noted from the 1986 photograph.

1995—This black and white vertical photograph is at an approximate scale of 1 inch to 400 feet. The photograph is not clear, making interpretation difficult. Few major changes are noted from the 1962 photograph.

3.1.2 Site Specific Utility Connections

The City of Spokane was contacted to obtain water, sanitary sewer, and stormwater locations and connection information. Location maps provided (Appendix B) indicated that the buildings located in the subject site are connected to the City of Spokane's sanitary sewer. During the onsite inspection, sewer connections were located within the buildings, following exposed pipes from sumps to sewer mains, and those sumps that were not visibly connected were noted as potential release areas.

3.2 Field Explorations and Methods

An initial visual inspection of the site was conducted by Bob Martin/CH2M HILL and Ken Hoffman/Leppo Consultants on March 2, 1999. Test pit and sampling locations and depths were selected and marked based on the Phase I ESA report and the observations collected during the visual inspection. The One Call utility locating service was contacted and marked utility locations on and adjacent to the property prior to conducting test pit activities (Appendix C).

The test pit and soil sampling locations were selected to provide assessment information regarding the presence or absence of suspect impacted soils in the project area. Twelve sampling locations were selected for test pits (TP), numbered one through 11 and DW, with one location, TP-8, not advanced due to backhoe refusal at the near surface (Figure 3). The following is a discussion of each test pit location and selection criteria for the assessment.

TP-1 was advanced in the reportedly former area of the underground fuel tanks in the parking area on the west side of the dairy garage building to determine the presence of materials associated with an underground tank excavation/removal and to ascertain the condition of the backfill materials.

TP-2 and TP-3 were advanced along the west wall of the dairy garage building, adjacent to an exterior sump/pump area and an interior sump located within the building. The soil samples were collected to identify the presence of impacted soil associated with the operation of either of these sumps. Additionally, these test pits were used to aid in the identification of potential impacted soil beneath the building.

TP-4 was advanced in the area of the former fuel dispenser area, along the east side of the dairy garage building. Soil samples were collected to identify the presence of impacted soils associated with the operation of the fuel dispensers and the depth to bedrock along the east side of the building.

TP-5 and TP-6 were advanced in the railroad yard area and adjacent to the former Van Water Chemical Warehouse, located adjacent to the subject site to the south. The Van Water

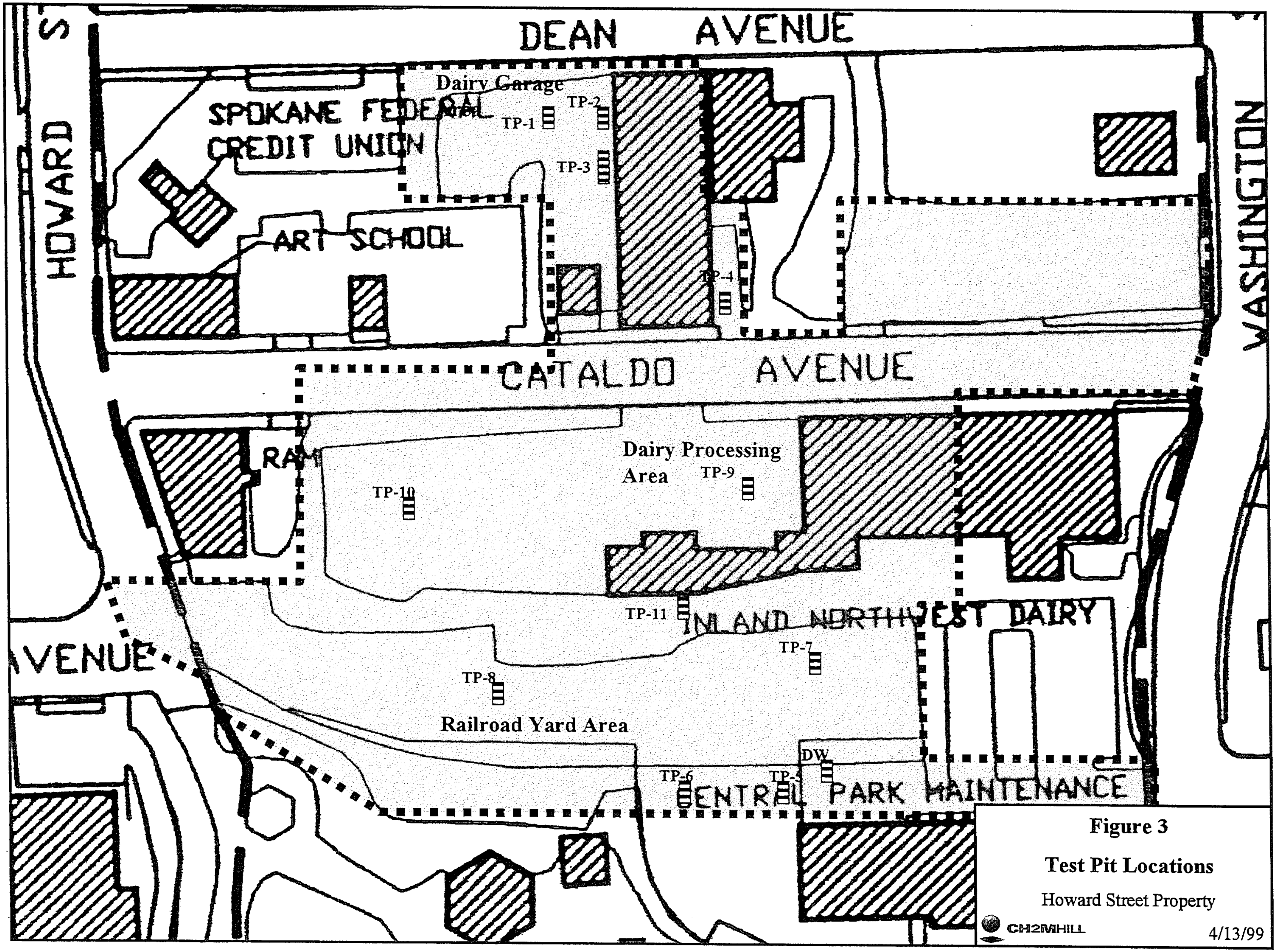


Figure 3

Test Pit Locations

Howard Street Property

CH2MHILL 4/13/99

Chemical Warehouse was the location of bulk chemical storage including PCE and Acid tanks. The test pits were located adjacent to the property in the area of the former tanks as indicated by the Sanborn Insurance maps reviewed from the Phase I report. Soil samples were also collected to aid in the characterization of the soil/backfill material in the area of the railroad yard. Additionally, the test pits provided depth to bedrock information for an estimation of backfill volume in this area.

TP-7 and TP-8 were located on the east and west sides of the railroad yard, respectively. Soil samples were collected to identify the presence of impacted soils in this area and provide characterization data regarding the backfill material, to be used in conjunction with results from TP-5 and TP-6. TP-8 was proposed but not advanced due to backhoe refusal at the near surface. Based on the in field observations during the assessment, another test pit was not advanced due to the relatively consistent nature of the materials encountered in the railroad yard area.

TP-9 and TP-10 were advanced in the dairy processing parking area, east and west, respectively. Soil samples were collected in these test pits to identify the presence of impacted soils related to ongoing delivery truck and parking practices ongoing at the site. Additionally, the test pits provided depth to bedrock information in this area for an estimation of total backfill volume.

TP-11 was advanced in an area of surface staining observed beneath a compressor exhaust pipe. Soil sampling was conducted to identify the nature of the impacted soil and vertical extent.

Test pit DW was advanced adjacent to an existing dry well located within the railroad yard area and adjacent to the former Van Water Chemical Storage building. Soil samples were collected to identify the presence of impacted soils that may have been a result of infiltration from the dry well.

3.2.1 Test Pit Methods

The subsurface exploration and soil sampling program was initiated and completed on March 4, 1999. Test pit excavation was provided by Roar Tech, Inc. of Spokane, Washington, a licensed contractor, using a Case 580 backhoe equipped with an extended hoe. The monitoring, sampling, and documentation from the limited subsurface exploration program were performed by Leppo Consultants, Inc. (LCI) under the direct observation of CH2M HILL personnel. Eleven exploratory test pits were completed in the subject site with the collection of a total of 17 soil samples. Immediately after collection of soil samples, the test pits were backfilled using wheel roll and bucket compaction methods to the approximate surface grade. Test pits were not left open or unsupervised during the investigation due to the accessible nature of the site and the presence of continual pedestrian traffic.

Soil samples were collected using a gloved hand from the backhoe bucket. Approximately two soil samples were collected from each of the test pits. Soils conditions were observed and obvious, visual contamination (odors, staining) noted, as encountered. Soils and geologic material encountered at each sample interval were interpreted and recorded. Field screening techniques (water sheen test) were employed to document obvious petroleum contamination. Soil samples were collected by LCI personnel and placed in laboratory-provided glass containers with Teflon-lined lids. The soil samples selected for chemical analysis were labeled, dated, and managed under chain-of-custody protocol. Samples were placed in an iced cooler (4 degrees Celsius) and transported to the contracted laboratory. Table 1 summarizes the exploratory test pit field observations for the subsurface investigation. Figure 3 shows the test pit locations in the subject site.

A total 17 soil samples were submitted to Columbia Analytical Services, Inc. of Kelso, Washington for chemical analysis in accordance with State and EPA protocols. The samples were analyzed for Semivolatile Organics by GCMS (EPA method 8270), Volatile Organics BTEX (EPA method 8020), PCBs (EPA method 8082), Total Petroleum Hydrocarbons as diesel with extended carbon range (WTPH-DX), Total Petroleum Hydrocarbons as gasoline (WTPH-G), Total Metal for Lead (EPA method 7421), and RCRA 8 Total Metals Arsenic (EPA method 7060A), Barium (EPA method 6010B), Cadmium (EPA method 6010B), Chromium (EPA method 6010B), Lead (EPA method 6010B), Mercury (EPA method 7471A), Selenium (EPA method 7740), and Silver (EPA method 6010B). The completed chain of custody, analytical reports, and quality assurance quality control report are included in Appendix D.

3.2.2 Waste Management— Materials Inventory

During the prior Phase I ESA, numerous chemical and paint/varnish containers and drums were observed within the dairy garage building and in the dairy processing building, located at 444 and 411 West Cataldo Avenue, respectively. On March 3, 1999 LCI performed a more detailed inspection of these two buildings in order to provide an inventory of chemical containers and possible contents for waste management purposes. Table 2 summarizes the results of the inspection and inventory of existing materials onsite.

3.2.3 Visual Asbestos Inspection

Within the state of Washington, various state and federal regulations govern asbestos containing materials (ACM) for both worker safety and air emissions. These include, but are not necessarily limited to:

1. U.S. Environmental Protection Agency asbestos standards (NESHAP, 40 CFR Part 61, Subpart M),
2. Occupational Safety and Health Administration (OSHA) general industry and construction standards (29CFR Parts 1910 and 1926), and
3. Washington Department of Labor and Industries (L&I) general occupational health standards (Chapter 296-62 WAC).

In Spokane County, the Spokane County Air Pollution Control Authority (SCAPCA) regulations govern potential releases of air-borne asbestos fibers during structure renovations or demolition. The local code (Article IX, Regulation I Standards for Removal and Disposal of Asbestos-Containing Materials) requires an owner or operator of a demolition or renovation activity to obtain an asbestos inspection, performed by an AHERA Building Inspector. The asbestos inspection means a written report describing an inspection using the procedures in the U.S. Environmental Protection Agency (EPA) regulation 40 CFR

TABLE 1
TEST PIT SUMMARY

Test Pit No.	Test Pit Depth (ft.)	Sample Depths (ft.)	Soil Description & Notes
TP1	7	5	Poorly graded pea gravel (GP) (fill), loose, caving-in at 7 ft., no petroleum odors or staining. Located in former UST cavity.
TP2	10	5 10	Poorly graded gravel (GP), loose, no petroleum odors or staining.
TP3	7	5	Poorly graded gravel (GP), loose, no petroleum odors or staining.
TP4	4	4	Poorly graded gravel (GP), loose, heavy petroleum odor and staining. Located near former fuel dispenser. Basalt bedrock at 4 ft. with difficult excavating,.
TP5	8	5 8	0-2 ft.: Poorly graded gravel (GP), dark brown, loose, debris consisting of bricks and concrete, no petroleum odor or staining. 2-8 ft.: Poorly graded gravel (GP), light brown, loose, basalt cobbles up to 6 in. diameter, no petroleum odors or staining.
TP6	6	1.5 6	0-2 ft.: Poorly graded gravel (GP) with debris consisting of bricks and angular concrete chunks, no petroleum odors or staining. Basalt bedrock at 6 ft.
TP7	4	1.5 4	Well graded gravels w/ sand (GW), no petroleum odors or staining. Basalt bedrock at 4 ft.
TP9	2	2	Well graded gravels (GW), no petroleum odors or staining. Basalt bedrock at 2 ft.
TP10	8	5 8	Well graded gravels (GW), loose gravels caving in at 8 ft., no petroleum odors or staining.
TP11	3	1 3	Well graded gravels w/ sand (GW), no petroleum odors or staining. Basalt bedrock at 3 ft.
DW (Dry Well)	5	5	Dry well back filled with loose 3/4 in. minus pea gravel (GP).

TABLE 2
WASTE MANAGEMENT – MATERIALS INVENTORY
Building: Broadview Dairy Garage   Address: 444 West Cataldo Avenue

Location/Functional Space	No.	Drum Label/Contents	Drum Color	Drum Condition	Notes
East Side Store Rooms Basement	50	1 gallon paint/varnish cans	misc.	Fair to poor	loose and boxed
East Side Store Rooms Basement	75	1 quart paint/varnish cans	misc.	Fair to poor	loose and boxed
East Side Store Rooms Basement	1	35 gal. Drum - gear oil (SAE 90)	blue	Fair	only 5 to 10 gals. product
West Side – Garage Area Basement	1	55 gal. Drum - waste oil / mineral oil	gold	Fair	
West Side – Garage Area Basement	32	Empty drums, steel and poly	misc.	Fair to good	
West Side—Garage Outside	4	55 gal. Drum	Black	Good	Site soil (assumed)
Building: Broadview Dairy Processing Facility Address: 411 West Cataldo Avenue					
North Side Storage Room	1	Ecolab Paradigm 2030 Liquid Builder	White poly	Good	55 gal., new product, cleaning agent
North Side Storage Room	1	Ecolab Matrix Acid Liquid Sanitizer	Blue poly	Good	55 gal., new product, cleaning agent
North Side Storage Room	1	Ecolab Paradigm 2010 Liquid Detergent	White poly	Good	55 gal., new product, cleaning agent

763 (Asbestos-Containing Materials in Schools, Final Rule and Notice, AHERA, October 30, 1987; and Asbestos Model Accreditation Plan, ASHARA, February 3, 1994).

SCAPCA and L&I require that specific regulated ACM must be removed or controlled in a facility prior to demolition or renovation activities that would break up, dislodge, or similarly disturb the material or preclude access to the material for subsequent removal. Requirements exist for subsequent notification to all persons who may come in contact with the material and notification and fees to SCAPCA and L&I for regulated asbestos removal projects.

A visual observation of the site buildings was conducted to identify suspected ACM. The subject buildings consisted of the Dairy Garage located at 444 West Cataldo Avenue, former Dairy Garage Office located at 508 West Cataldo Avenue, and the dairy processing facility located at 411 West Cataldo Avenue. The construction date of the dairy garage building is reported as 1914, while the office building is believed to have been constructed in the 1940s. The dairy processing building was originally constructed in 1907. Generally, buildings constructed after 1980/1981 may be considered less likely to contain ACM. In the interest of due diligence the visual observation was completed to identify suspected ACM. Based on this visual observation, additional asbestos program plans (formal asbestos survey, project management and abatement, and so on) could be implemented, as necessary.

The inspection did not include destructive sampling of building materials, which typically includes a bulk sample and analysis matrix based on homogeneous materials and functional spaces, assessment of material conditions, review of potential for disturbance information, and a separate report defined by regulatory-based survey techniques. This visual inspection is not intended as an ACM survey required by any state or federal requirements. It is intended to provide a professional opinion of the potential for ACM within the building for environmental due diligence purposes and abatement estimate.

The visual inspection included readily available observations for potential or suspected ACM. All readily accessible areas and spaces of the building's were inspected, including common areas most likely frequented by occupants, workers, or others. Destructive or intrusive survey techniques were not employed in this inspection for access to subsurface materials (that is, below floors, behind existing walls or coverings, and so on). Both interior and exterior building components were generally examined, including the roof-top, ceiling areas, exposed wall or ceiling spaces, or other readily accessible areas.

4.0 Results

4.1 Subsurface Investigation

A total of 11 test pits were conducted in the subject site on March 4, 1999. A summary of the test pit observations is shown on Table 1. The results of the test pits in general indicated a shallower depth to bedrock than anticipated in the dairy processing area, 2 to 8 feet, and in the railroad yard area, 4 to 8 feet.

The soils encountered in TP-1 were primarily a poorly graded, well rounded, fine gravel. The type of soil encountered and consolidation conditions were indicative of backfill material associated with an underground storage tank cavity. Obvious indications of impacted soils were not observed in the test pit.

The soils encountered in TP-2 and TP-3 were poorly graded gravel, apparently outside the former underground storage tank cavity, in the native backfill adjacent to the dairy garage building. Obvious indications of impacted soils were not observed in the test pits.

TP-4 was advanced in the area of the former fuel dispensers, on the east side of the dairy garage building. The soils encountered were poorly graded gravel. Heavy petroleum staining and odor were evident. The test pit was excavated to the depth of bedrock, approximately 4 feet bgs. The pit was extended to the west, to the exterior foundation of the building, and to the north to estimate the lateral extent of the impacted soil. The petroleum staining extended to the building foundation to the west and approximately 8 feet to the north.

The soils encountered in TP-5 and TP-6 were stratified between the upper 2 feet and below. The upper 2 feet of soil were comprised of a relatively darker soil including recognizable brick and concrete debris. The soil below the approximate 2-foot depth was poorly graded gravel including basalt cobbles, to the relatively shallow basalt bedrock depth of 6 to 8 feet bgs. Obvious indications of impacted soils were not observed in the test pits.

The soils encountered in TP-7 were well-graded gravel with sand to the basalt bedrock, at approximately 4 feet bgs. Obvious indications of impacted soils were not observed in the test pit.

The soils encountered in TP-9 and TP-10 were well-graded gravel to the basalt bedrock, at approximately 2 and 8 feet bgs, respectively. Obvious indications of impacted soils were not observed in the test pits.

The soils encountered in TP-11 were well-graded gravel with sand to the basalt bedrock, at approximately 3 feet bgs. The upper 1-foot of soil was darker in color with some evidence of staining. Indications of impacted soil below approximately 1-foot bgs were not observed in the test pit.

The soils encountered in test pit DW were a poorly graded, loose 3/4-inch, rounded gravel, assumed to be dry well backfill materials used to facilitate drainage from the dry well to the formation.

4.2 Soil Sample Analytical Results

A total of 17 soil samples were submitted for analytical chemical testing. The summary of results from the testing are shown on Table 3. The samples submitted are listed in Table 2, however, only the analyses that resulted in a detection were included in the summary. The analytical results were compared to the Model Toxics Control Act (MTCA) Method A Cleanup Levels. The Method A lookup table in MTCA are suggested as a starting point in the evaluation of the impacted soil at the site. Other methods, Method B and Method C for example, are formula methods to be used with site conditions to determine site specific cleanup levels.

Semivolatile organic compounds (solvents) were of concern but were not detected in the soil samples collected. Additionally, the soils samples analyzed for PCB's were also non-detect.

Soil samples collected from TP-2 resulted in the detection of Total Lead at 1,450 milligrams per kilogram (mg/kg) in the 10-foot bgs interval, and concentrations of oil at 202 mg/kg, at 5 feet bgs, and 268 mg/kg, at 10 feet bgs. These results and the proximity of the test pit to the sump in the interior of the dairy garage suggest a possible release associated with the operation of the sump. Both the Total Lead and Oil concentrations detected are above the Model Toxics Control Act (MTCA) Method A Cleanup Levels.

Soil samples collected from TP-4 resulted in the detection of Total Petroleum Hydrocarbons as Diesel (TPHD), oil, and Total Petroleum Hydrocarbons as Gasoline (TPHG) concentrations above the MTCA Method A cleanup levels. Soil concentrations of TPHD were reported at 24,000 mg/kg, oil at 4,400 mg/kg, and TPHG at 430 mg/kg. The results for TPHG and oil were interpreted to be apparent overlap elution from the large diesel results, and not indicative of gasoline or oil present in the sample (personal comm., Lynda Huckestein, 3/15/99). The results suggest a release associated with the fueling operations and dispensers located along the east side of the dairy garage building. Benzene and toluene concentrations were non-detect and ethylbenzene and total xylene concentrations were below the MTCA Method A cleanup levels indicative of a very weathered petroleum hydrocarbon.

Soil samples collected from TP-6 resulted in the detection of Cadmium, at 6 mg/kg, and Lead, at 376 mg/kg, concentrations above the MTCA Method A cleanup levels for soil, but lower than the cleanup levels for industrial soil. TP-6 was located in the railroad yard area, adjacent to the southern boundary of the subject site. The metal concentrations detected are apparently representative of backfill material encountered in the project site, based on test pit analytical results for metals, occurrence throughout the site, and the detection of metals well below the shallow subsurface.

Soil samples collected from TP-7 resulted in the detection of metals, Cadmium and Lead, Total Petroleum Hydrocarbons as diesel and oil, and Polynuclear Aromatic Hydrocarbons (PAH). TP-7 was located in the railroad yard area, centrally located on the east side of the subject site. Soil concentrations of Cadmium, at 2 mg/kg, and Lead, at 364 mg/kg, were

TABLE 3
ANALYTICAL RESULTS
SOIL SAMPLES

Analysis Parameter	Method	MTCA Method A (soil)	MTCA Method A (Industrial Soil)	Analytical Results (mg/kg) TP1-5	TP2-5	TP2-10	TP3-5	TP4-4	TP5-5	TP5-8	TP6-1.5	TP6-6	TP7-1.5	TP7-4	TP9-2	TP10-5	TP10-8	TP11-1	TP11-3	DW-5
Metals																				
Total Pb	7421	250	1000	35	196	1450	24	158	9	9	-	-	21	-	37	73	89	-	-	-
Arsenic	7060A	20	200	-	-	-	-	-	12	9	9	9	7	8	-	-	-	5	10	10
Barium	6010B			-	-	-	-	-	33	38	145	154	470	228	-	-	-	180	130	56
Cadmium	6010B	2	10	-	-	-	-	-	ND	ND	ND	6	ND	2	-	-	-	ND	2	ND
Chromium	6010B	100	500	-	-	-	-	-	7	10	10	42	4	7	-	-	-	8	10	9
Lead	6010B	250	1000	-	-	-	-	-	-	-	129	376	-	364	-	-	-	174	543	54
Mercury	7471A	1	1	-	-	-	-	-	ND	ND	ND	ND	ND	ND	-	-	-	ND	0.3	ND
Selenium	7740			-	-	-	-	-	ND	ND	ND	ND	ND	ND	-	-	-	ND	ND	ND
Silver	6010B			-	-	-	-	-	ND	ND	ND	ND	ND	ND	-	-	-	ND	ND	ND
Semivolatile Organics																				
2-Methylnaphthalene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	0.6	ND	ND	ND	0.4	ND	ND
Phenanthrene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	1	ND	ND	ND	0.5	0.8	ND
Flouranthene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND	0.9	ND
Pyrene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	0.7	ND	ND	ND	0.4	0.9	ND
Benz(a)anthracene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND
Chrysene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	0.6	ND	ND	ND	0.3	0.4	ND
Benzo(b)fluoranthene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND	ND
Benzo(a)pyrene	8270C			ND	ND	ND	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND
TPH as Diesel and Oil																				
Diesel	WTPH-DX	200	200	ND	30	67	ND	24000	ND	ND	ND	ND	45	273	ND	29	ND	333	35	ND
Oil Misc.	WTPH-DX	200	200	ND	202	268	ND	4400	ND	ND	ND	ND	ND	685	ND	193	111	782	103	ND
TPH as Gasoline and BTEX																				
Gasoline	WTPH-G	100	100	ND	ND	ND	ND	430	17	ND	93	7	ND	9	4	ND	ND	15	8	ND
Benzene	8020	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	8020	40	40	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	0.1	ND	ND	ND	0.1	0.3	ND
Ethylbenzene	8020	20	20	ND	ND	ND	ND	0.2	3.4	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	8020	20	20	ND	ND	0.1	ND	2.5	4.2	ND	0.5	ND	ND	0.3	ND	ND	ND	0.4	0.5	ND

Note: Designates above MTCA Method A Concentrations for Industrial Soil
Designates above MTCA Method A Concentrations for Soil

detected above the MTCA Method A cleanup levels for soil, but lower than the cleanup levels for industrial soil. The metal concentrations detected are similar to those detected in TP-6 and are considered representative of backfill material. Concentrations of Total Petroleum Hydrocarbons as diesel and oil were detected at 273 mg/kg and 685 mg/kg, respectively, and are above the MTCA method A cleanup levels. However, benzene and ethylbenzene concentrations were nondetect, while toluene and total xylene concentrations were below MTCA method A cleanup levels. The following PAH compound concentrations were detected and are most likely a result of the historical use of the area as a railroad yard; 0.6 mg/kg of 2-Methylnaphthalene, 1 mg/kg of Phenanthrene, 0.7 mg/kg of Flouranthene, 0.7 mg/kg of Pyrene, and 0.6 mg/kg of Chrysene.

Soil samples collected from TP-11 resulted in the detection of metals, Cadmium and Lead, Total Petroleum Hydrocarbons as diesel and oil, and Polynuclear Aromatic Hydrocarbons (PAH). TP-11 was located north of the railroad yard and are topographically higher, in the area directly behind the dairy processing building. Soil concentrations of Cadmium, at 2 mg/kg, and Lead, at 543 mg/kg, were detected at approximately 3 feet bgs, above the MTCA Method A cleanup levels for soil, but lower than the cleanup levels for industrial soil. The metal concentrations detected are similar to those detected in the shallower interval in TP-11 at 1-foot bgs, TP-6, and TP-7, and are considered representative of backfill material. Concentrations of Total Petroleum Hydrocarbons as diesel and oil were detected at 333 mg/kg and 782 mg/kg, respectively, at the 1-foot interval and are above the MTCA Method A cleanup levels. The vertical extent of the TPH detected is consider limited to the first 1 to 3 feet based on the lower concentrations detected at the 3-foot interval in TP-11. Additionally, benzene and ethylbenzene concentrations were non-detect while toluene and total xylene concentrations were below MTCA Method A cleanup levels. Chemical concentrations of PAHs were detected at both the 1-foot and 3-foot intervals in TP-11, ranging from 0.3 to 0.9 mg/kg (Table 2). The PAH compound concentrations detected are most likely a result of the historical use of the area as a railroad yard.

4.3 Waste Management—Materials Inventory

A large quantity of containers, various materials, and drums were observed during the Phase I ESA in the two buildings located on the subject site. A more detailed investigation included a site visit and materials inventory. The results of the materials inventory are summarized on Table 2, with the exception of the dairy garage building where a heating oil tank approximately 50 percent full is located in the basement, in good condition with no evidence of release.

The various containers collectively result in a relatively large quantity of painting materials, gear and waste oil, cleaning agents in containers that appeared in fair to good condition without obvious evidence of release. The 32 55-gallon drums noted in the Phase I ESA investigation were empty without evidence of material stored in the containers previously. Four unlabeled 55-gallon steel drums located outside the dairy garage building are assumed to contain soil that may have been generated during the previously conducted environmental investigations.

4.4 Asbestos Assessment Results

The dairy garage, dairy garage office, and processing buildings were inspected for suspect ACM on March 3, 1999. Table 4 summarizes the results of the visual suspect ACM inspection conducted. The inspection results of the dairy garage building indicate the presence of approximately 460 linear feet of thermal system insulation, 275 square feet of vinyl tile, and 13,000 square feet of hot asphalt roof, which are all considered suspect ACM.

The inspection results of the dairy garage office indicate approximately 40 linear feet of thermal system insulation, 900 square feet of vinyl tile, and 1,200 square feet of asphalt shingle roof, which are all considered suspect ACM.

The inspection results of the dairy processing facility indicate approximately 1,050 linear feet of thermal system insulation, 1,000 square feet of vinyl tile, 19,500 square feet of hot asphalt roof, 1,500 square feet of transite paneling (concrete asbestos board), and 150 square feet of paper wrap duct work, which are all considered suspect ACM.

TABLE 4

VISUAL ASBESTOS INSPECTION SUMMARY

Building: Broadview Dairy Garage Address: 444 West Cataldo Ave.

Material	Space: Top Floor East Side Bldg. Lube Rack Room	Friability/Condition	Space: Top Floor West Side Bldg. Raised Office Rooms	Friability/Condition	Space: Basement West & East Side Open Storage Area	Friability/Condition
TSI Straight Run Pipe (LF)	10 LF (3 in. pipe)	Friable / Good			100 LF (2 to 4 in. pipe)	Friable / Damaged
Vinyl Floor Tile (SF)			275 SF (9x9 beige)	Friable / Significantly Damaged		/
TSI Straight Run Pipe (LF)	350 LF (2 to 3 in. Pipe)	Friable / Significantly Damaged				/
Hot Asphalt Roof (SF)			13,000 SF (tar w/ fiberglass)	Non-Friable/ Significantly Damaged		/

Building: Broadview Dairy Garage - Office Address: 508 West Cataldo Ave.

Material	Space: Top Floor Main and Side Offices	Friability/Condition	Space: Roof	Friability/Condition	Space: Basement Furnace Rook	Friability/Condition
TSI Straight Run Pipe (LF)		/			40 LF (2 to 3 in. pipe)	Friable / Damaged
Vinyl Floor Tile (SF)	900 SF (9x9 beige)	Non-Friable / Good				

Material	Space: Top Floor East Side Bldg. Lube Rack Room	Friability/Condition	Space: Top Floor West Side Bldg. Raised Office Rooms	Friability/Condition	Space: Basement West & East Side Open Storage Area	Friability/Condition
Asphalt Shingle (SF)			1200 SF (gray composite)	Non-Friable / Significantly Damage		

TABLE 4

VISUAL ASBESTOS INSPECTION SUMMARY

Building: Broadview Dairy Garage Address: 444 West Cataldo Ave.

Building: Broadview Dairy Processing Facility Address: 411 West Cataldo Ave						
Material	**Space: Attic West Side Bldg. Main Processing Rm.**	**Friability/Condition**	**Space: 2nd Floor West Side Bldg. Storage Area**	**Friability/Condition**	**Space: Top Floor West Side Bldg. Offices/Viewing Room**	**Friability/Condition**
TSI Straight Run Pipe (LF)	750 LF (4 to 6 in. pipe)	Friable / Damaged	200 LF (4 to 6 in. pipe)	Friable / Damaged		
Duct Work (Paper) (LF)	150 LF (2x2 ft.plenum cover)	Friable / Damaged				
Vinyl Floor Tile (SF)					1000 SF(12x12, white&green)	Non-Friable / Good
Material	**Space: Top Floor East Side Bldg. Lube Rack Room**	**Friability/Condition**	**Space: Top Floor West Side Bldg. Raised Office Rooms**	**Friability/Condition**	**Space: Basement West & East Side Open Storage Area**	**Friability/Condition**
Transite Paneling (SF)			1500 SF (4[illegible] 4x8 ft. panels)	Non-Friable / Good		
Material	**Space: Roof West Side Processing Facility**	**Friability/Condition**	**Space: 2nd Floor West Side Bldg. Storage Area**	**Friability/Condition**	**Space:**	**Friability/Condition**
TSI Straight Run Pipe (LF)	100 LF (loose debris)	Friable / Significantly Damaged				
Hot Asphalt Roof (SF)	19,500 SF (tar w/ fiberglass)	Non-Friable/ Significantly Damaged				

TABLE 4, CONTINUED
SUMMARY OF SUSPECTED ACM

MATERIAL	AMOUNT
TSI - Pipe Wrap (2 to 3 in.)	500 LF
TSI - Pipe Wrap (4 to 6 in.)	950 LF
TSI - Plenum Cover (2 x 2 ft.)	150 LF
Vinyl Floor Tile (9 x 9 in.)	1,175 SF
Vinyl Floor Tile (12 x 12 in.)	1,000 SF
Transite Panels (4 x 8 ft.)	1,500 SF
Asphalt Shingle	1,200 SF
Hot Asphalt Roof	32,500 SF
Loose Asbestos Debris	100 LF

Appendix A

Prior Investigations

COPY

FILE

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

August 22, 1989

Mr. John Cahalan
Attorney at Law
851 S.W. 6th, Suite 1500
Portland, OR 97204

Re: Contaminated Property at Carnation Dairy, At or Near West 508 Cataldo Avenue, Spokane, Washington

Dear Mr. Cahalan:

This letter is to respond to notification to our office concerning leaky underground storage tanks at the above referenced Carnation Dairy site. The notification was made on August 16, 1989, by Roger Brown, Jr., Anania Geologic Engineering (AGE), Portland, Oregon.

The following will provide guidance on what kind of actions can be taken under the Model Toxics Control Act (MTCA) to ensure the cleanup of sites contaminated with petroleum products. In summary, Ecology may take the following actions:

1. Perform the necessary remedial actions and recover from liable parties the amounts spent by Ecology.

2. Negotiate a settlement agreement with potentially liable parties and the Attorney General's Office, detailing the specific actions to be taken at the site. This agreement would be filed with the Superior Court as a Consent Decree following public notice and hearing. (Ecology is preparing regulations to implement statutory provision for settlement agreements provided by Section 4(4) of the MTCA.)

3. Issue an ORDER requiring potentially liable parties to perform specific remedial actions. Under the authority of Section 5 of the MTCA, Ecology can issue an Administrative ORDER for any phase of remedial action, from the investigatory through the cleanup phase. Or, the potential liable parties can initiate action to negotiate the terms and conditions of a Compliance Order with Ecology. However, at this time, a compliance Order would only be considered for investigatory phases and not cleanup phases. Both types of orders will require public notice.

   All orders and Consent Degrees require a period of public notice and public comment. The liable parties will be required to pay Ecology's oversight costs during the process.

They will also be responsible for meeting the substantive and procedural requirements of all applicable local, state and federal permits.

You may decide to proceed with investigatory and/or cleanup work outside of any of the above referenced formal processes provided by the MTCA. If you decide to take such an approach, please keep in mind that any technical assistance which Ecology might provide would be limited. There is also no guarantee that Ecology will not conduct or require that you conduct further action at the site based on our own evaluation.

Because of your potential liability for the situation at this site, you are advised to carefully document any remedial actions which you may undertake independent of Ecology's involvement. Therefore, it is advisable to obtain the services of a competent engineering or geotechnical firm having experience in the cleanup of sites contaminated with hazardous substances. Remember that you will be responsible for meeting the substantive and procedural requirements of all applicable local, state and federal permits.

We ask that you carefully consider the options available before deciding which one best serves your interests and needs. Should you have any questions, please contact me.

Sincerely,

PMF

Phil Leinart
Hazardous Waste Investigations
and Cleanup Program
Waste Management Section

PL:adw

cc: Roger Brown, Jr., P.G.

ROBERT L. ALLEN
BRADLEY O. BAKER
JONATHAN A. BENNETT*
ROBERT F. BLACKMORE
JOHN C. CAHALAN
ROBERT R. CARNEY
GEORGE J. COOPER, III
ANDREW S. CRAIG
I. KENNETH DAVIS
MICHAEL J. FRANCIS
BRYAN W. GRUETTER**
JACK D. HOFFMAN
WILLIAM L. KOVACS'
SALLY R. LEISURE
MARSHA MURRAY-LUSBY

NATHAN L. COHEN
JAMES G. SMITH
OF COUNSEL

DUNN, CARNEY, ALLEN, HIGGINS & TONGUE

ATTORNEYS AT LAW

851 S.W. SIXTH AVENUE, SUITE 1500
PACIFIC FIRST FEDERAL BUILDING
PORTLAND, OREGON 97204-1357
FACSIMILE (503) 224-7324
TELEPHONE (503) 224-6440

CENTRAL OREGON OFFICE
709 N.W. WALL STREET, SUITE 103
BEND, OREGON 97701
FACSIMILE (503) 389-6907
TELEPHONE (503) 382-9241

WASHINGTON, D.C. OFFICE
1900 L. STREET, N.W.
SUITE 500
WASHINGTON, D.C. 20036
TELEPHONE (202) 862-4972

ROBERT L. NASH**
GREGORY C. NEWTON**
JEFFREY F. NUDELMAN*
JOAN O'NEILL P.C.*
GILBERT E. PARKER
HELLE RODE
CHARLES D. RUTTAN
JOSEPH P. SHANNON*
G. KENNETH SHIROISHI***
SHANNON I. SKOPIL*
DONALD E. TEMPLETON*
THOMAS H. TONGUE
DANIEL F. VIDAS
ROBERT K. WINGER

* ADMITTED IN OREGON AND WASHINGTON
** ADMITTED IN OREGON AND CALIFORNIA
' ADMITTED IN PENNSYLVANIA WASHINGTON, D.C., NOT ADMITTED IN OREGON
** RESIDENT, BEND OFFICE

June 22, 1990

RECEIVED
JUN 25 1990

Phil Leinart, P.G.
Hydrogeologist
Department of Ecology
Eastern Regional Office
N. 4601 Monroe, Suite 100
Spokane, WA 99205-1295

Re: Former Carnation Dairy Facility
Located at 411 West Cataldo Street
Spokane, Washington

Dear Mr. Leinart:

As you know, this office represents Carnation Company on this project. This letter will outline the remaining remediation measures that will be undertaken on behalf of Carnation in regard to the closure and cleanup of the underground storage tank site at the above-referenced facility.

The activities described in this letter were disclosed to you during our meeting at your office on May 31, 1990. During that meeting, you indicated that you had no objection to and would take no action against Carnation if the remediation measures were conducted substantially as we described them to you on that date. We are therefore requesting that you respond with a letter to me confirming your position in that regard.

Background

In August of 1989, Carnation's environmental contractor, AGE, removed two underground storage tanks at the facility. As soon as the tanks were removed, additional excavation was conducted to remove soil that exhibited visible evidence of petroleum contamination. In total, approximately 100 cubic yards of this soil was excavated and stockpiled on site on an inert, visqueen surface.

Drilling operations were subsequently conducted to obtain soil and groundwater samples. There were seven borings in the immediate vicinity of the tank excavation and an additional two borings in the presumed downgradient direction. No groundwater contamination was detected in the resulting tests. Furthermore, out of a total of 51 soil samples, only four samples revealed contamination above the Washington Department of Ecology's 200 ppm/TPH action level for soil remediation. Copies of the test results are enclosed for your review.

Remediation Plans

1. The Soil in the Ground. During our meeting on May 31,1990, I expressed the view that the soil sample results did not warrant any further excavation for purposes of remediating the soil that remains in the ground. I based my position on the following considerations:

1. the source of the contamination was eliminated when the tanks were removed;

2. the most seriously contaminated soil was removed following the tank removal;

3. the remaining contamination is comparatively minor;

4. natural degradation will eventually bring the contaminated soils below current action levels;

5. the absence of groundwater contamination removes any likelihood of harm to the public welfare or the environment.

In addition to these considerations, our drilling contractor has advised that any further excavation would be dangerous from a structural perspective. For all of these reasons, it is our position that it would not be appropriate to perform further excavation and that any future remediation measures should be confined to the previously excavated soil that remains stockpiled at the site.

2. The Excavated Soil. The stockpiled soil has been tested for total petroleum hydrocarbons and volatile organics. These tests reveal that the contamination has been reduced to a

level below 500 ppm TPH. Consequently, the Spokane County Air Pollution Control Authority will allow this soil to be remediated by vaporization on-site without requiring additional protective measures, such as a carbon granule overlay. We presented these findings to the County's representative, who advised that our "land-farming" proposal meets with his approval Therefore, we intend to have the above-ground soil remediated in this fashion until it falls below DOE's 200 ppm action level.

Conclusions

In light of the above, I have advised Carnation to proceed to remediate the stockpiled soil without performing any further excavation or remediation relative to the soils that remain in the ground. I would be grateful if you would send us a reply letter stating that you have no objection to the remediation plans described in this letter. To facilitate your response, a stamped, self-addressed envelope is enclosed.

Thank you very much for your cooperation and guidance. We will provide you with a final closure report when the work is completed.

Very truly yours,

John C. Cahalan

John C. Cahalan

JCC dja
(12745)
Enclosures
cc: Carnation Company
Attn: Malcolm Ewing
AGE
Attn: James Wallace

Table 1: Underground Storage Tank Specifications

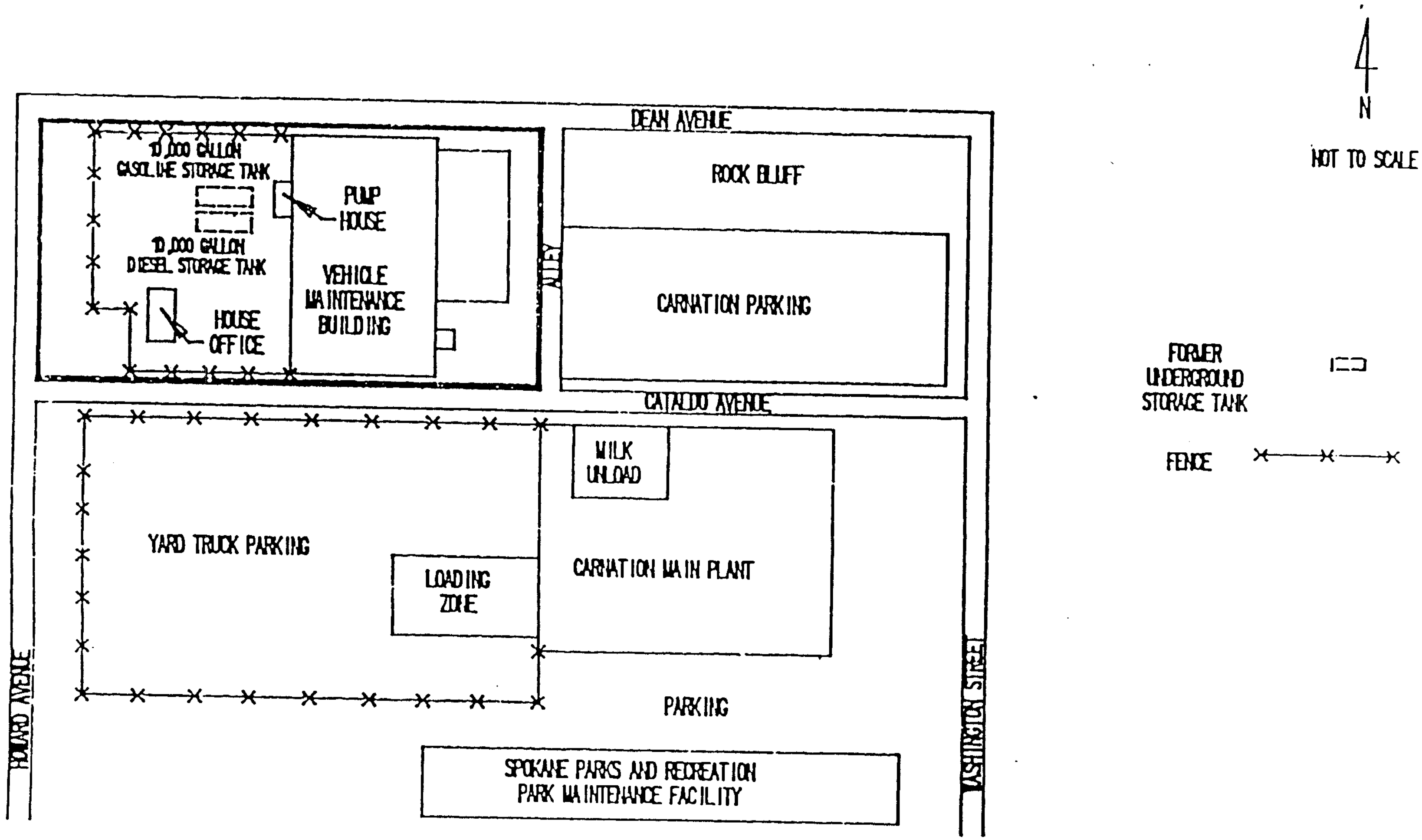
Gasoline Storage Tank

Nominal Capacity:	10,000 gallons
Stored Product:	gasoline
Diameter:	96 inches
Length:	28 feet
Burial Depth:	40 inches
Estimated Age:	>20 years

Diesel Storage Tank

Nominal Capacity:	10,000 gallons
Stored Product:	diesel
Diameter:	91 inches
Length:	30.5 feet
Burial Depth:	40 inches
Estimated Age:	>20 years

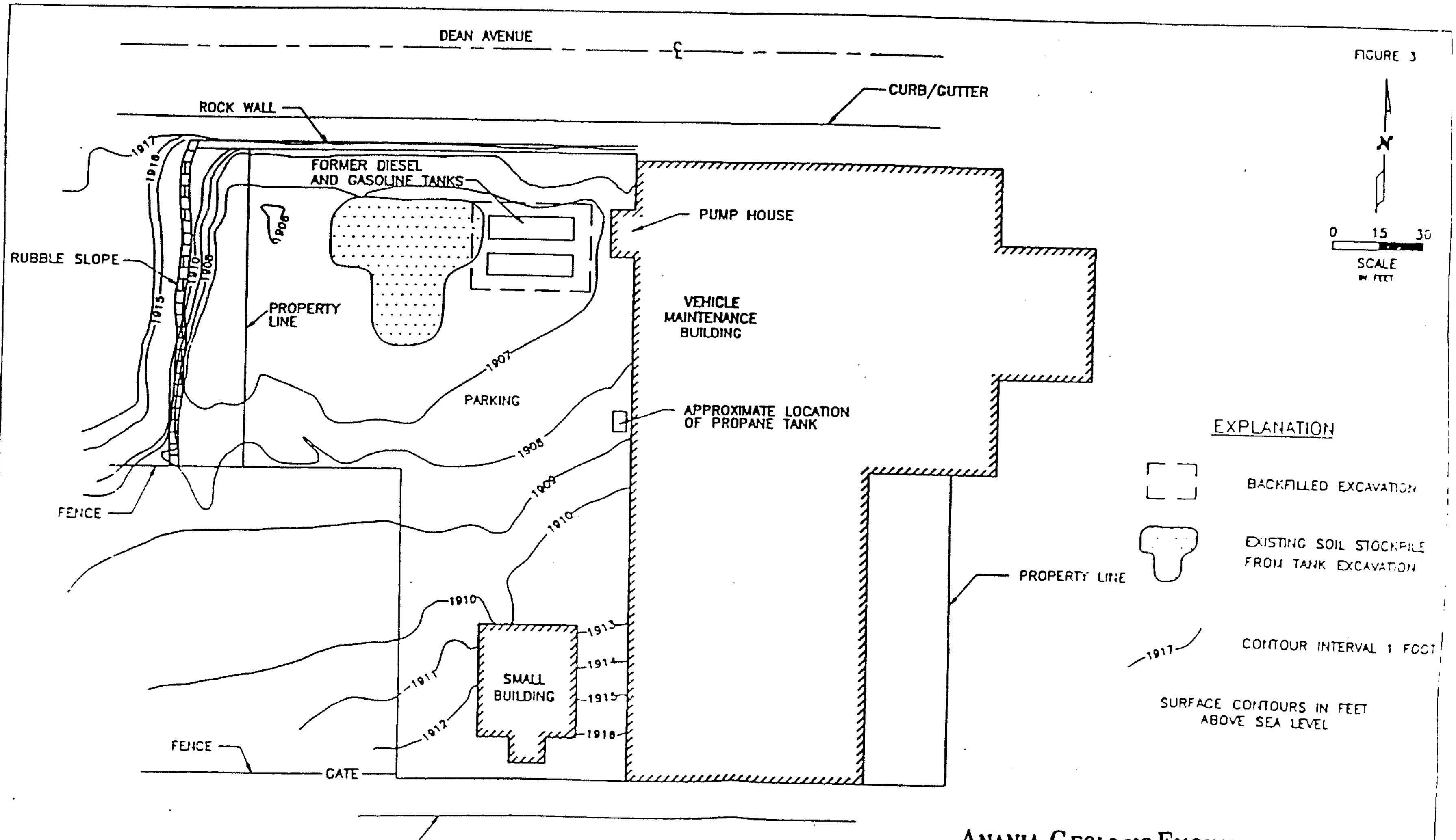
FIGURE 2



REFERENCE: "Preliminary Environmental Site Assesment Carnation Dairy Facilities Portland, Oregon and Spokane, Seattle, Aberdeen and Bremerton, Washington"
Hart Crowser Company
1989

ANANIA GEOLOGIC ENGINEERING

TITLE: FACILITY LAYOUT			
PROJECT NAME:	CARNATION FOREMOST DAIRIES	PROJECT NO:	004-89-080
SITE LOCATION:	407-413 CATALDO AVENUE, SPOKANE, WASHINGTON		
DATE: 4/24/90	DRAWING NO.: 080-008	SCALE:	NOT TO SCALE

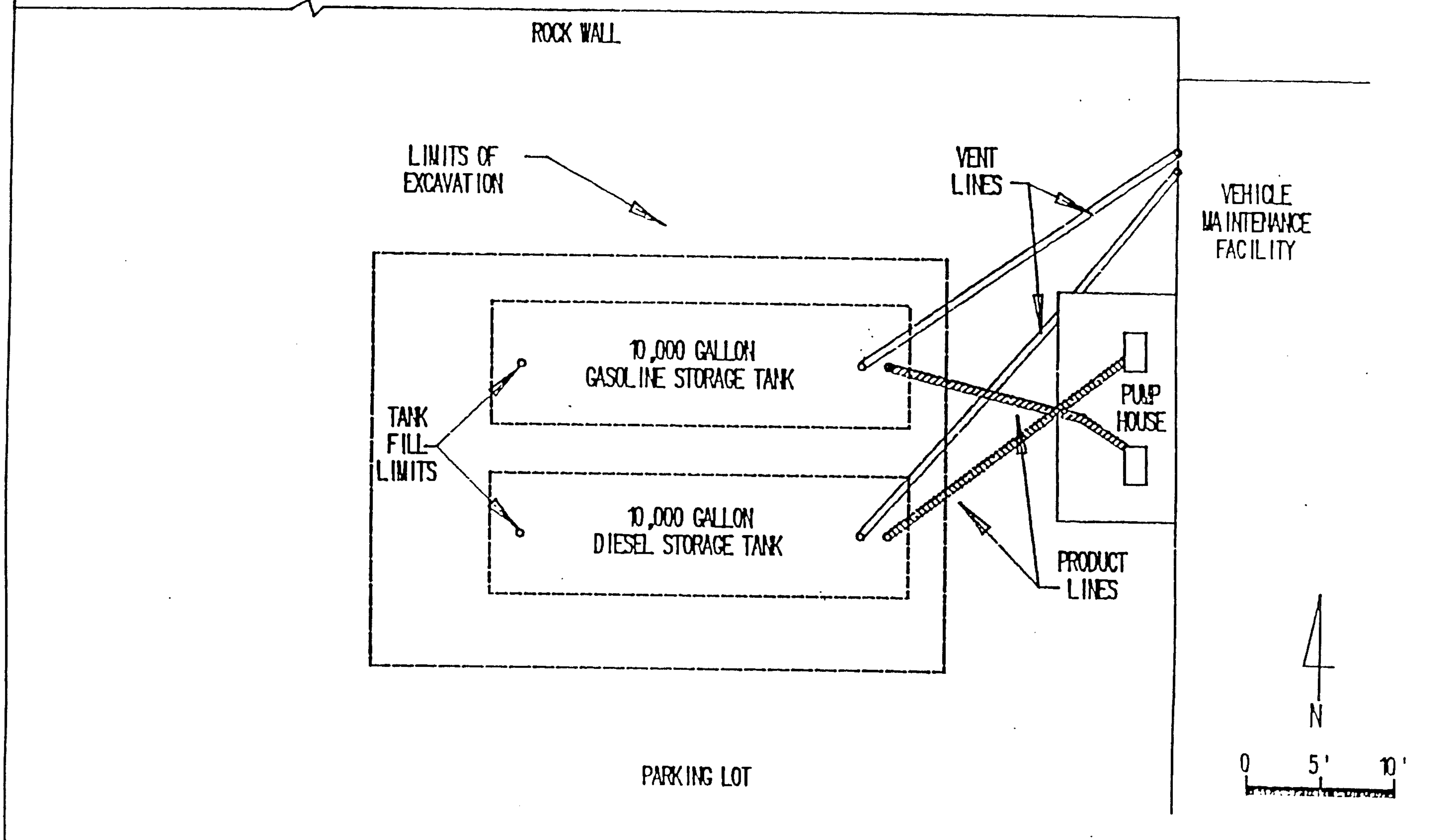


ANANIA GEOLOGIC ENGINEERING

TITLE: SITE MAP SHOWING TOPOGRAPHIC CONTOURS
PROJECT NAME: CARNATION/SPOKANE
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON

DATE: 4/24/90	DRAWING NO.: 080-002	SCALE: 1"=30'	PROJECT NO.: 004-89-080

FIGURE 4

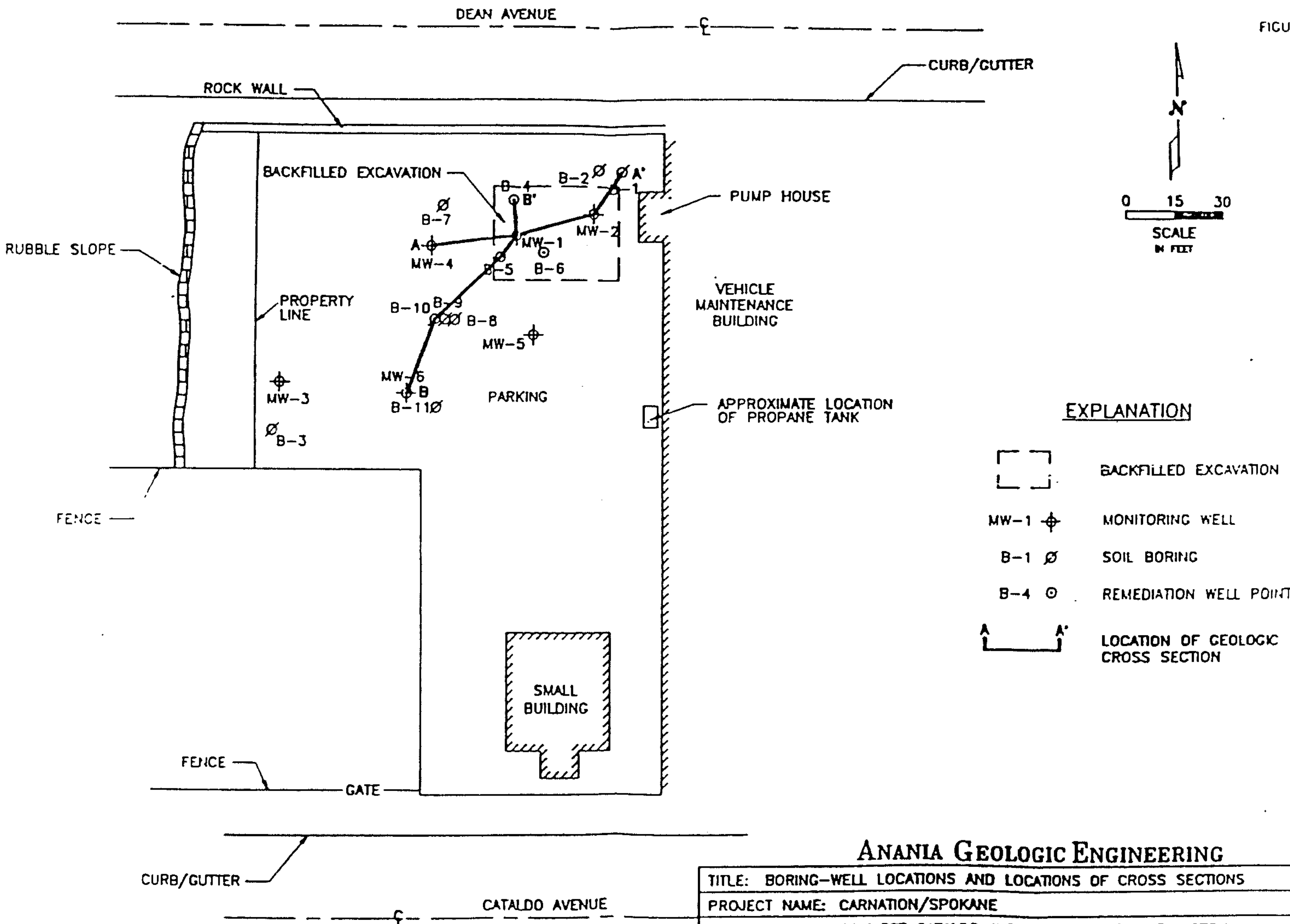


Note: Locations not surveyed

ANANIA GEOLOGIC ENGINEERING

TITLE:	UNDERGROUND STORAGE TANK AND PIPING LOCATIONS		
PROJECT NAME:	CARNATION FOREMOST DAIRIES	PROJECT NO:	004-89-080
SITE LOCATION:	407-413 CATALDO AVENUE, SPOKANE, WASHINGTON		
DATE: 4/24/90	DRAWING NO.: 080-002	SCALE:	1" = 10'

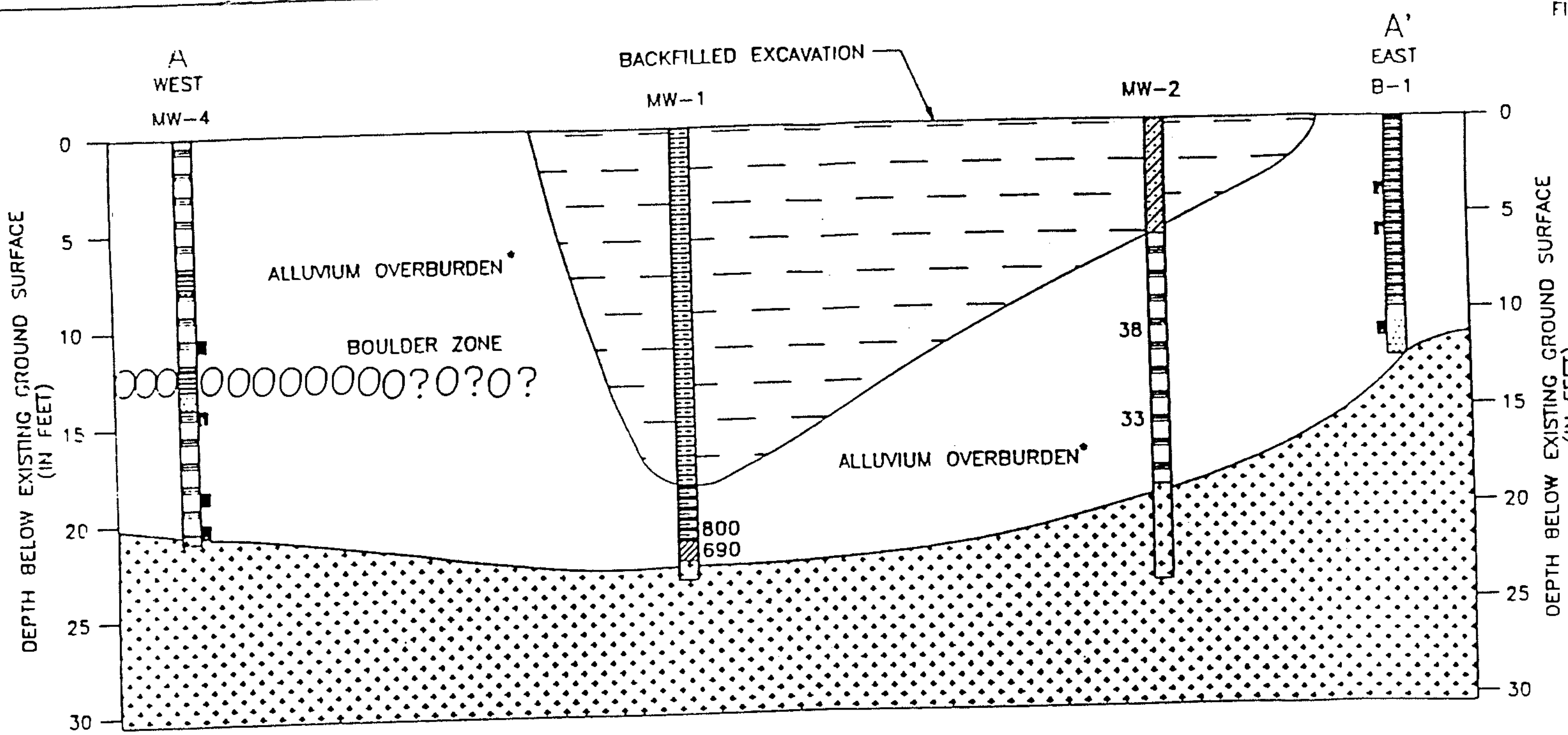
FIGURE 5



ANANIA GEOLOGIC ENGINEERING

TITLE: BORING-WELL LOCATIONS AND LOCATIONS OF CROSS SECTIONS			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-008	SCALE: 1"=30'	PROJECT NO.: 004-89-080

FIGURE 7



EXPLANATION

BASALT

SILTY SANDS

GRAVELLY OR SANDY CLAYS

CLAYEY SANDS

POORLY GRADED GRAVEL SAND SILT MIXTURES

POORLY GRADED GRAVEL SAND MIXTURES

WELL GRADED GRAVEL SAND MIXTURES

PEA GRAVEL BACKFILL

800 TOTAL PETROLEUM HYDROCARBONS (TPH) CONCENTRATION (ppm) BASED ON EPA METHOD 418.1

■ CONSTITUENTS NOT DETECTED AT OR ABOVE DETECTION LIMITS

? UNEXPLORED AREA

*REFER TO BORINGS FOR DETAILED LITHOLOGY

SCALE IN FEET
0 6

ANANIA GEOLOGIC ENGINEERING

TITLE: CROSS SECTION A-A'			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-005	SCALE: 1" = 6'	PROJECT NO.: 004-89-08[illegible]

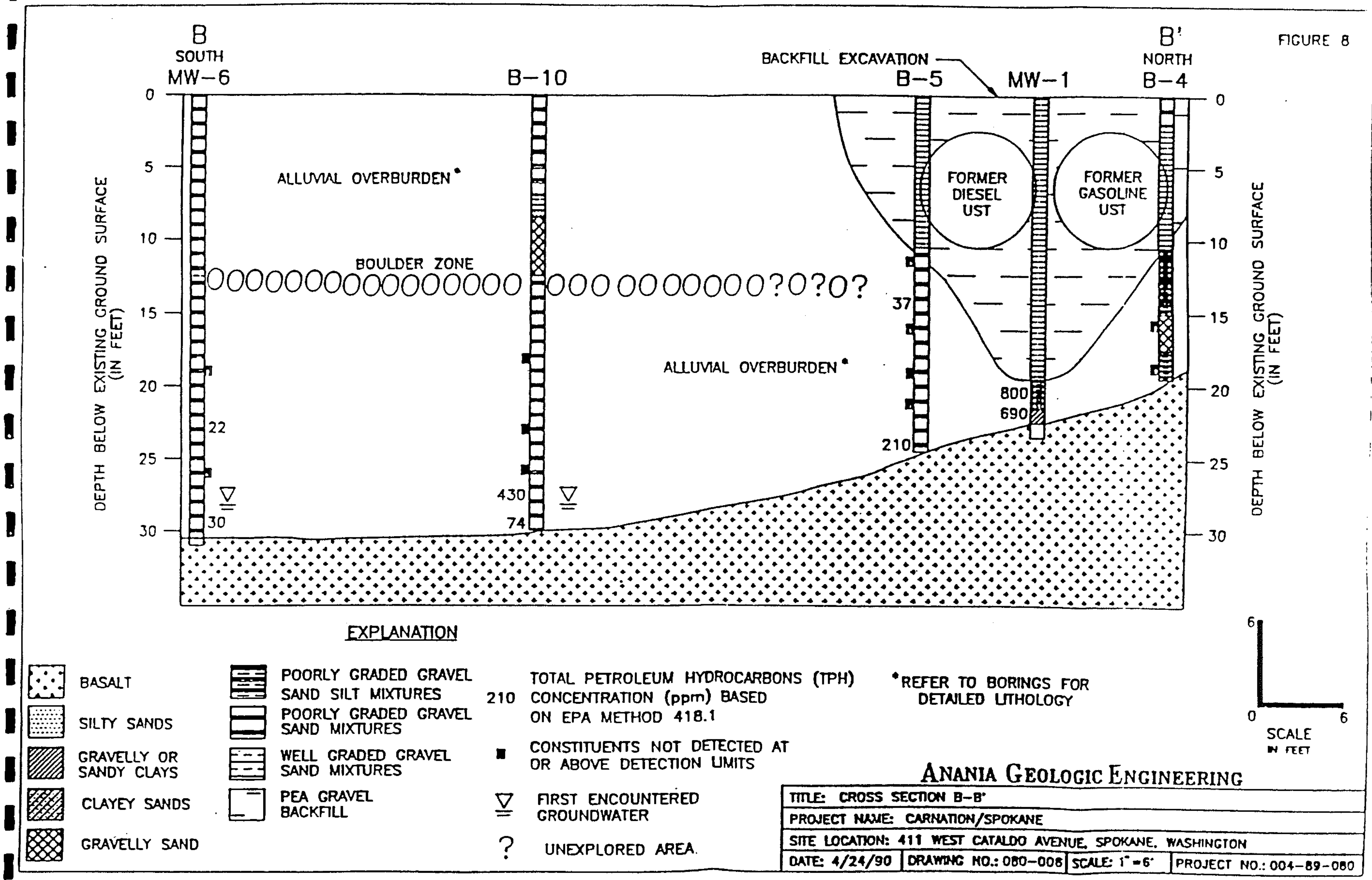
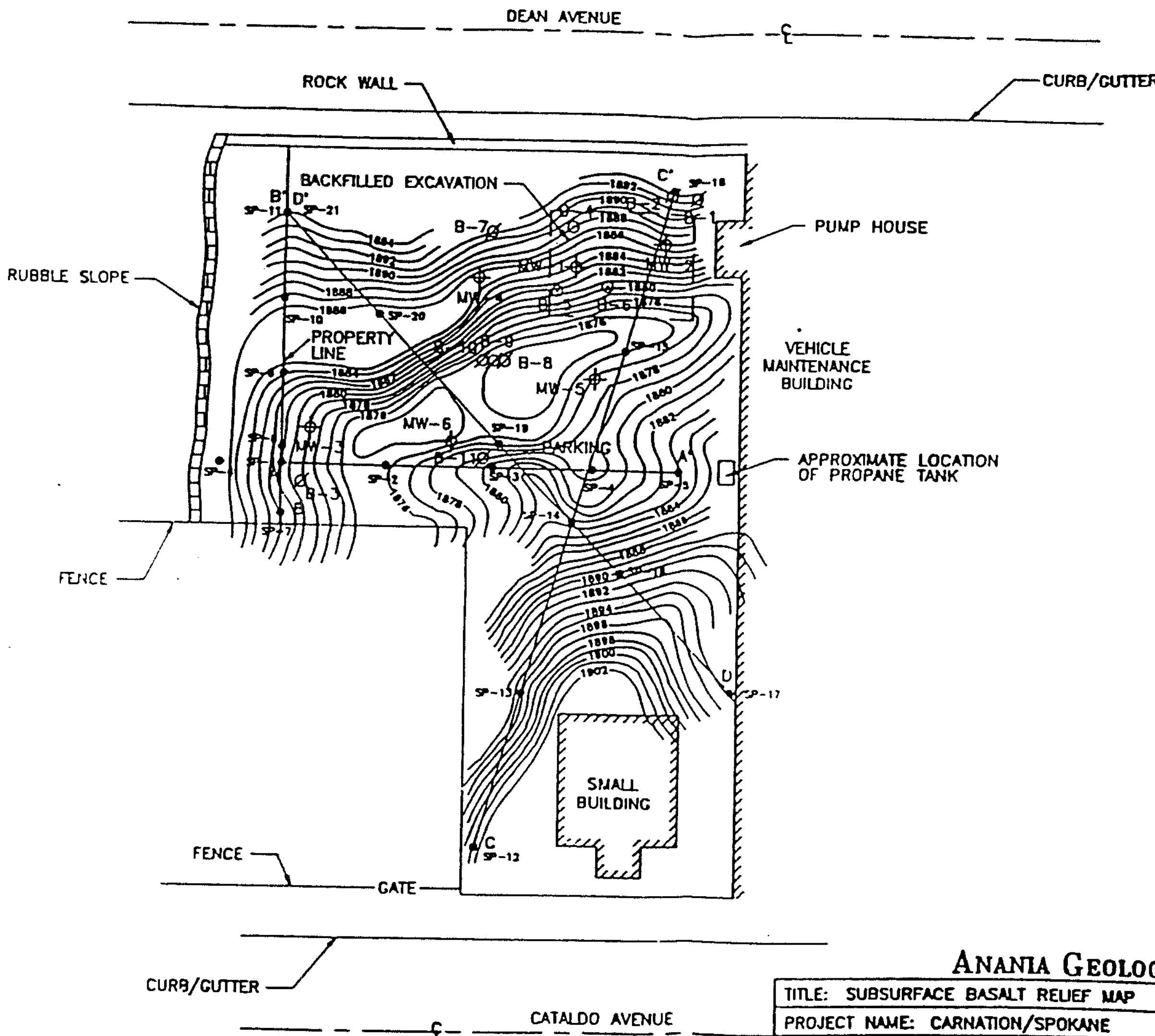


FIGURE 8
B
SOUTH
MW-6
B-10
BACKFILL EXCAVATION
B-5
MW-1
B'
NORTH
B-4
DEPTH BELOW EXISTING GROUND SURFACE (IN FEET)
0
5
10
15
20
25
30
ALLUVIAL OVERBURDEN*
BOULDER ZONE
FORMER DIESEL UST
FORMER GASOLINE UST
ALLUVIAL OVERBURDEN*
22
30
430
74
37
210
800
690
EXPLANATION
BASALT
SILTY SANDS
GRAVELLY OR SANDY CLAYS
CLAYEY SANDS
GRAVELLY SAND
POORLY GRADED GRAVEL SAND SILT MIXTURES
POORLY GRADED GRAVEL SAND MIXTURES
WELL GRADED GRAVEL SAND MIXTURES
PEA GRAVEL BACKFILL
210 TOTAL PETROLEUM HYDROCARBONS (TPH) CONCENTRATION (ppm) BASED ON EPA METHOD 418.1
CONSTITUENTS NOT DETECTED AT OR ABOVE DETECTION LIMITS
FIRST ENCOUNTERED GROUNDWATER
? UNEXPLORED AREA.
*REFER TO BORINGS FOR DETAILED LITHOLOGY
SCALE IN FEET
0
6
6
ANANIA GEOLOGIC ENGINEERING
TITLE: CROSS SECTION B-B'
PROJECT NAME: CARNATION/SPOKANE
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON
DATE: 4/24/90
DRAWING NO.: 080-008
SCALE: 1"=6'
PROJECT NO.: 004-89-080

FIGURE 9



EXPLANATION

- BACKFILLED EXCAVATION
- MW-1 MONITORING WELL
- B-1 SOIL BORING
- B-4 REMEDIATION WELL POINT
- CONTOUR INTERVAL 1 FOOT

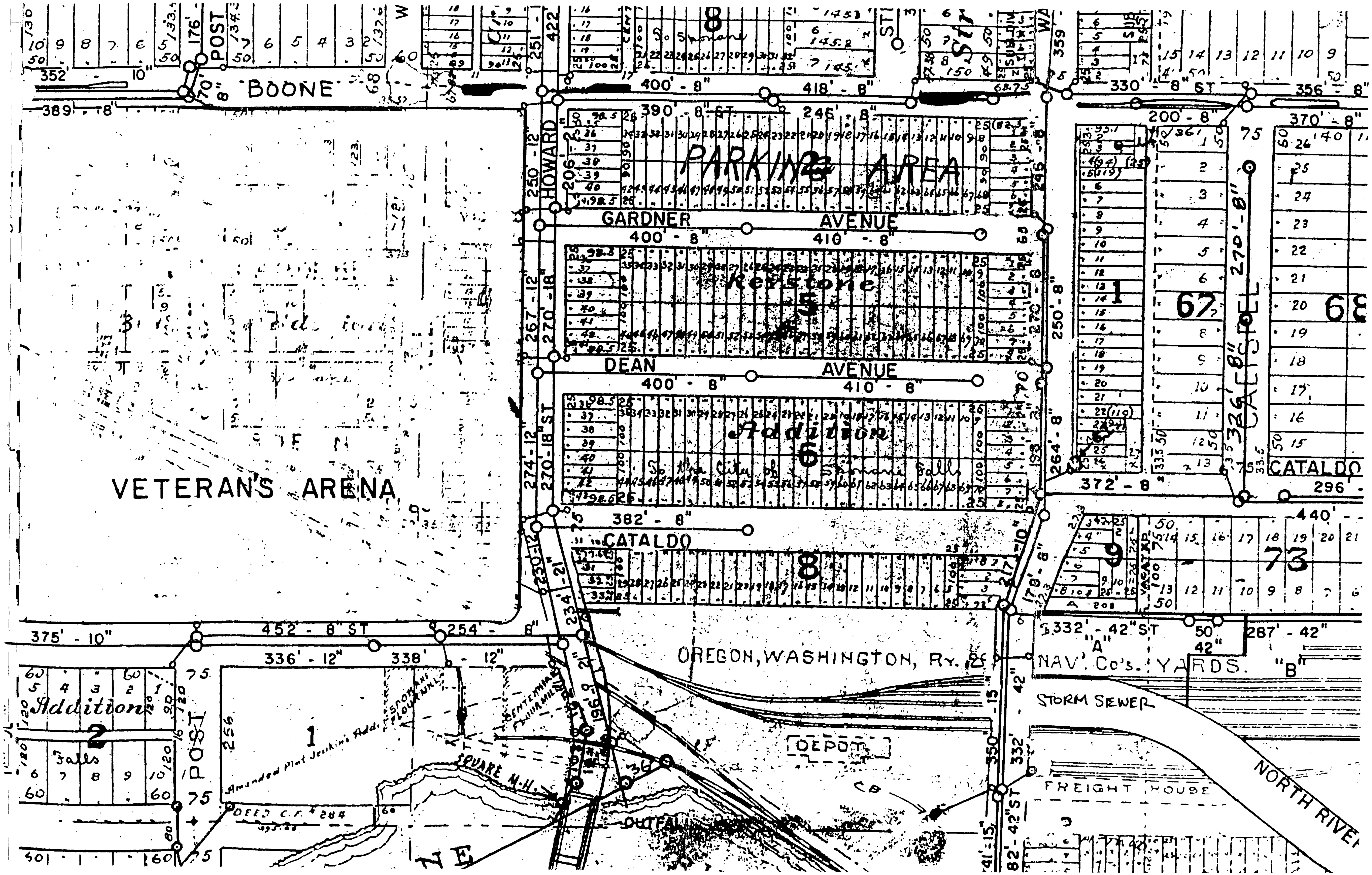
CONTOURS ON TOP OF BASALT SURFACE IN FEET ABOVE SEA LEVEL

ANANIA GEOLOGIC ENGINEERING

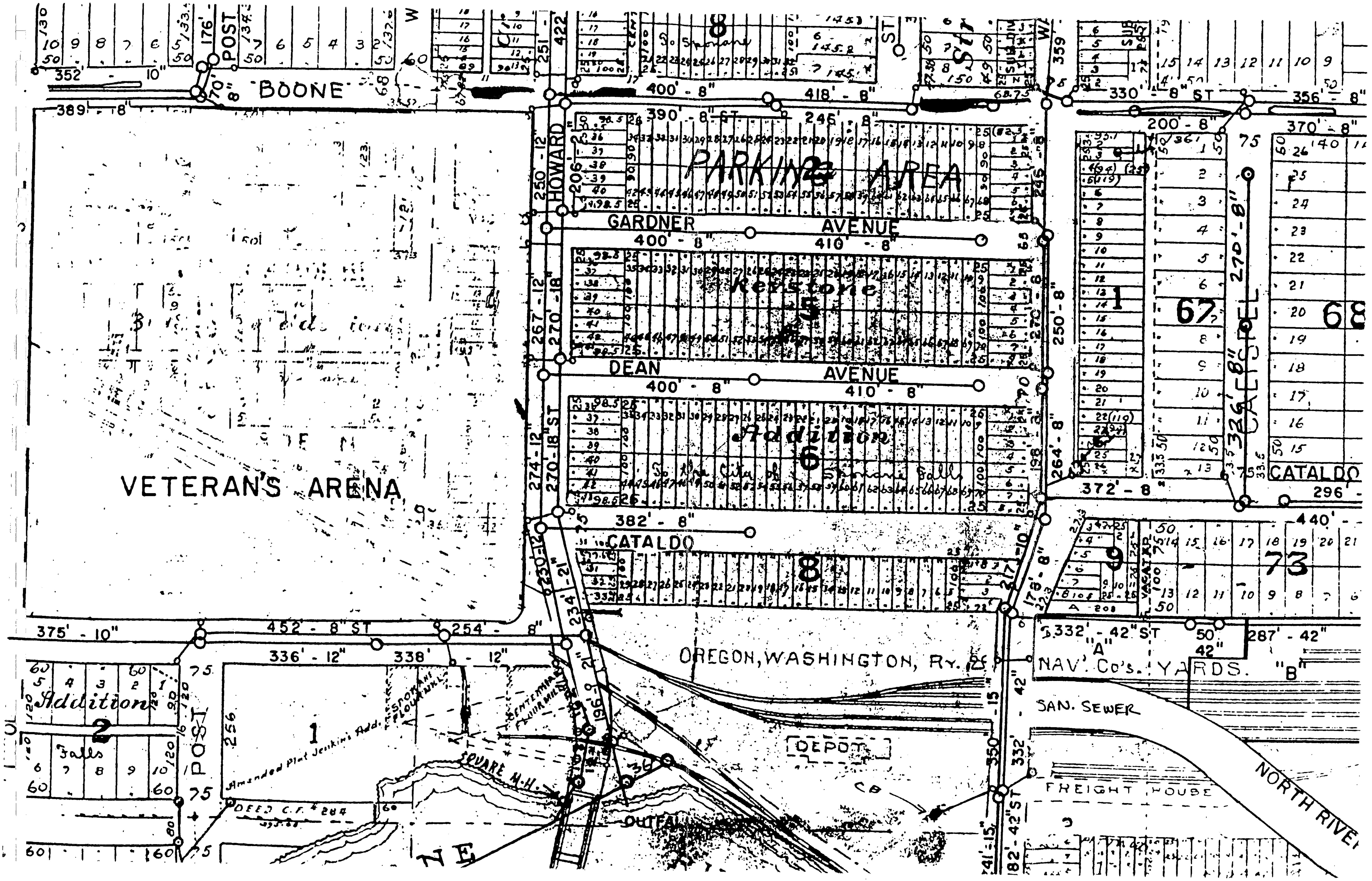
TITLE: SUBSURFACE BASALT RELIEF MAP			
PROJECT NAME: CARNATION/SPOKANE			
SITE LOCATION: 411 WEST CATALDO AVENUE, SPOKANE, WASHINGTON			
DATE: 4/24/90	DRAWING NO.: 080-007	SCALE: 1" = 30'	PROJECT NO.: 004-89-080

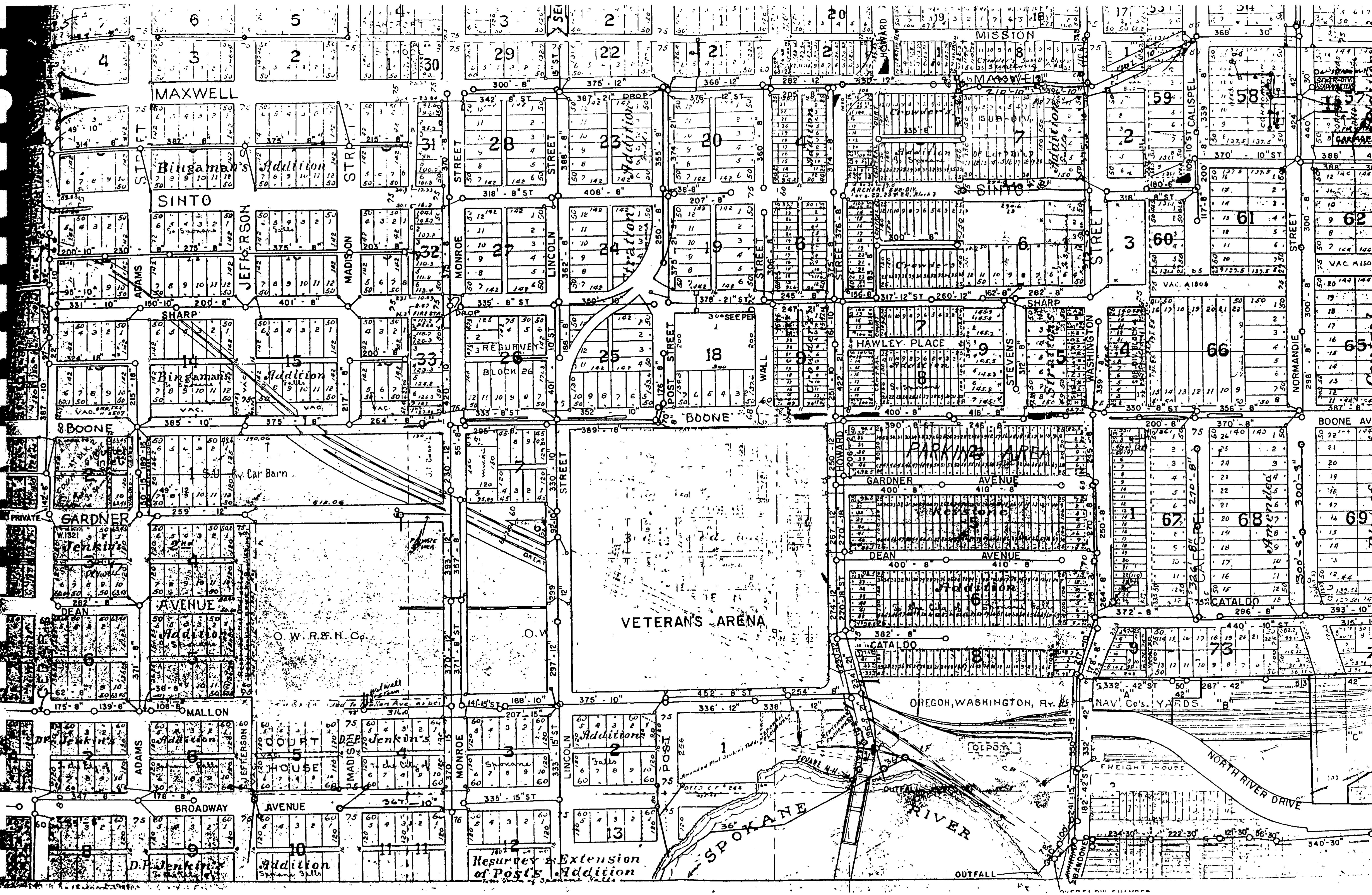
Appendix B

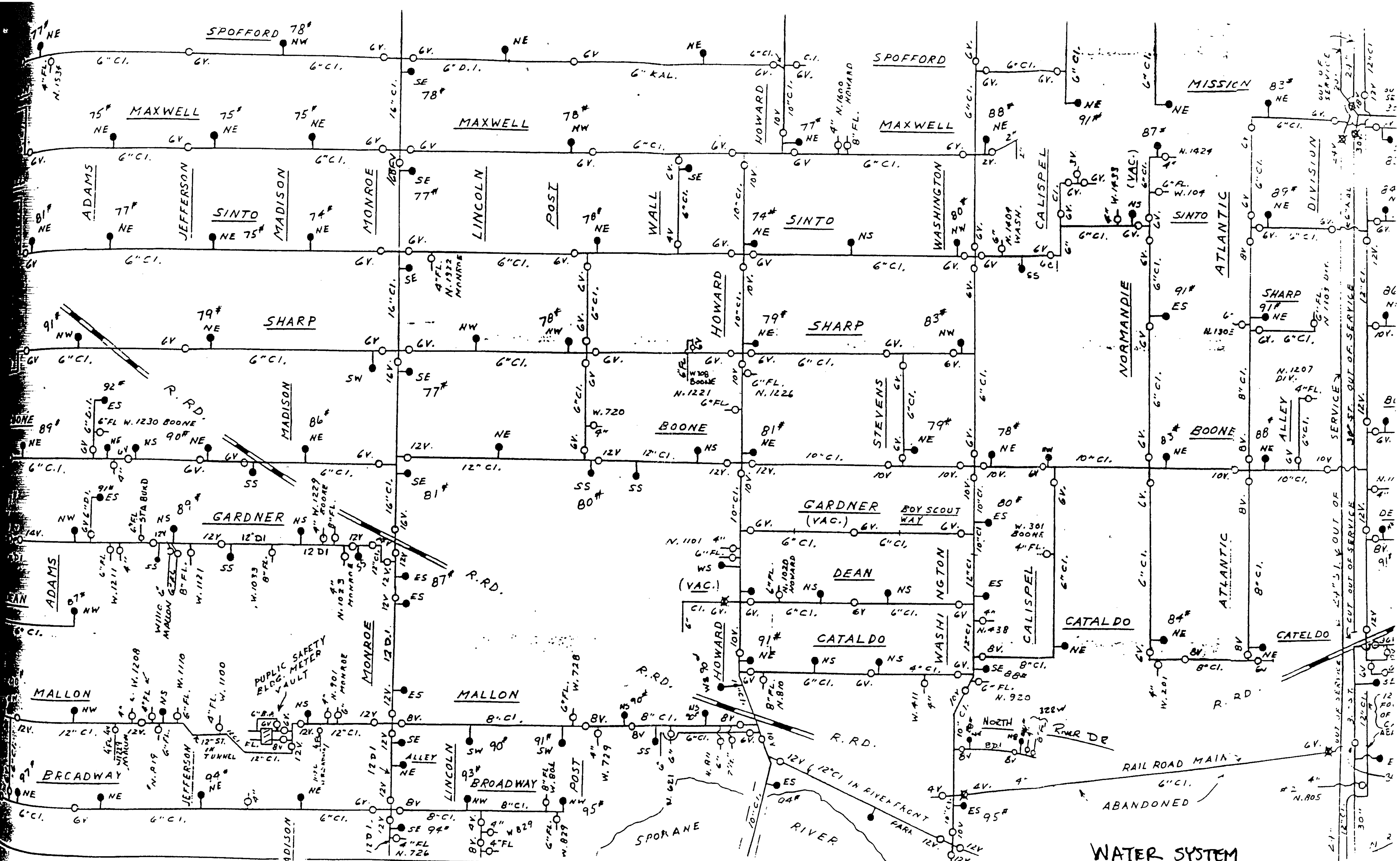
City Utility Maps



BOONE
POST
HOWARD
PARKING AREA
GARDNER AVENUE
DEAN AVENUE
CATALDO
Keystone
Addition
VETERAN'S ARENA
OREGON, WASHINGTON, RY. & NAV. Co's. YARDS
STORM SEWER
DEPOT
FREIGHT HOUSE
NORTH RIVER
SQUARE M.H.
OUTFALL
Amended Plat Jenkins Add.
Addition
Falls
400' - 8"
418' - 8"
390' - 8" ST
410' - 8"
382' - 8"
452' - 8" ST
375' - 10"
336' - 12"
338' - 12"
332' - 42" ST
287' - 42"
372' - 8
440'


BOONE
POST
HOWARD
PARKING AREA
GARDNER AVENUE
DEAN AVENUE
CATALDO
Keystone
Addition
VETERAN'S ARENA
OREGON, WASHINGTON, RY. & NAV. Co's. YARDS
SAN. SEWER
DEPOT
FREIGHT HOUSE
NORTH RIVER
Addition
Falls
Amended Plat Jenkin's Add.
SQUARE M.H.
OUTFALL
CATALDO
67
68
73


MISSION
MAXWELL
SINTO
SHARP
BOONE
BOONE AVENUE
GARDNER
GARDNER AVENUE
DEAN
DEAN AVENUE
AVENUE
MALLON
BROADWAY
CATALDO
ADAMS
JEFFERSON
MADISON
MONROE STREET
LINCOLN STREET
POST STREET
WALL
HOWARD
STEVENS
WASHINGTON
CALISPEL
NORMANDIE STREET
Bingaman's Addition
Crowder's Sub-Div.
Addition
HAWLEY PLACE
RESURVEY
BLOCK 26
FIRE STA.
Car Barn
PARKING AREA
Keystone
VETERAN'S ARENA
O. W. R.& N. Co.
COURT HOUSE
D.P. Jenkin's Addition
Resurvey & Extension of Post's Addition
OREGON, WASHINGTON, Ry. & NAV. Co's. YARDS
FREIGHT HOUSE
NORTH RIVER DRIVE
SPOKANE RIVER
OUTFALL
PRIVATE
Central Addition



LOW SYSTEM

N½ Sec. 18-25-43

(2-6-85) Revised 3/3/98 M/C

	52	
59	60	61
	68	

60

Appendix C

One Call Locate Request

ONE CALL SYSTEM - FACSIMILE LOCATE REQUEST (509) 624-0220

9903021134004 (PASSWORD USE ONLY)

Ticket No ______ Rev ___ Date / / Time ______ New ___ Opr ___

Revision of Existing Ticket Y **N** If Yes, Ticket No. ______

TICKET INFORMATION

Phone: (509) 747-2000 Ext: 240 Caller ID: ______

Caller: Bob Martin

Company: CH2M Hill

FAX Phone (509) 623-1622

Start Date: 3/5/99 Start Time: 10:00 Am

Short Notice Y **N**

Type of Work: Test Pits

Area Marked in White Paint: **Y** N

County: **Spokane** Stevens

City: Spokane

Address: Various 400 West Cataldo Ave

Nearest Cross Street: Washington St.

Location of Work: See attached maps.
Various locations.
We would like to get copies of utility maps in area.

Remarks: Please have utilities call Bob Martin 747-2000 x 240

Township 25N Range R43E Section 18 Qtr Section NE

Map Included on Separate Sheet **Y** N

Post-it® Fax Note 7671	Date 3/2/99 # of pages ▶ 4
To ONE CALL	From BOB MARTIN
Co./Dept.	Co. CH2M HILL
Phone #	Phone # 747-2000 x240
Fax # 509 624-0220	Fax #

Appendix D

Columbia Analytical Services Report

Columbia Analytical Services INC.
An Employee-Owned Company

March 15, 1999

Service Request No: K9901360

Bob Martin
CH2M Hill Corporation
9 South Washington, Suite 400
Spokane, WA 99201

Re: North Bank-Mallon Street/149259.AA-04.RP

Dear Bob:

Enclosed are the results of the rush sample(s) submitted to our laboratory on March 5, 1999. For your reference, these analyses have been assigned our service request number K9901360.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda A. Huckestein
Client Services Manager

LAH/clb

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill Corporation	**Service Request No.:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Received:**	3/5/99
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

The following difficulties were experienced during analysis of this batch:

The surrogate recovery for TPH-Gas and Diesel in sample TP4 (4') and TPH-Gas in sample TP6 (1.5') was outside normal CAS control limits because of matrix interference. The chromatogram showed components that prevented accurate quantitation of the surrogate. No further corrective action was taken.

Approved by ______ $\mathcal{}$ SAN ______ Date 3/15/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Solids

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	160.3M	Basis:	Wet
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
TP1 (5')	K9901360-001	3/8/99	94.6	
TP2 (5')	K9901360-002	3/8/99	91.8	
TP2 (10')	K9901360-003	3/8/99	92.3	
TP3 (5')	K9901360-004	3/8/99	92.9	
TP4 (4')	K9901360-005	3/8/99	85.6	
TP5 (5')	K9901360-006	3/8/99	95.2	
TP5 (8')	K9901360-007	3/8/99	94.5	
TP6 (1.5')	K9901360-008	3/8/99	88.8	
TP6 (6')	K9901360-009	3/8/99	88.3	
TP7 (1.5')	K9901360-010	3/8/99	66.6	
TP7 (4')	K9901360-011	3/8/99	83.3	
TP9 (2')	K9901360-012	3/8/99	92.8	
TP10 (5')	K9901360-013	3/8/99	93.0	
TP10 (8')	K9901360-014	3/8/99	89.1	
TP11 (1')	K9901360-015	3/8/99	89.2	
TP11 (3')	K9901360-016	3/8/99	85.3	
DW-5'	K9901360-017	3/8/99	93.2	

Approved By: SC Date: 3/9/99

TSOLIDS.XLT_Sample/01071998a

01360TS.AG1 - 017 3/9/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/9/99
Date Analyzed: 3/10/99

Total Lead
EPA Method 7421
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
TP1 (5')	K9901360-001	1	35
TP2 (5')	K9901360-002	1	196
TP2 (10')	K9901360-003	1	1450
TP3 (5')	K9901360-004	1	24
TP4 (4')	K9901360-005	1	158
TP9 (2')	K9901360-012	1	37
TP10 (5')	K9901360-013	1	73
TP10 (8')	K9901360-014	1	89
Method Blank	K9901360-MB	1	ND

Approved By: _______ Date: 3/12/99

1AMRL/102594
01360ICP.JC1 - Sample 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/9/99

Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

		Sample Name:	**TP5 (5')**	**TP5 (8')**	**TP6 (1.5')**
		Lab Code:	K9901360-006	K9901360-007	K9901360-008
		Date Analyzed:	3/10/99	3/10/99	3/10/99
Analyte	**EPA Method**	**MRL**			
Arsenic	7060A	1	12	9	9
Barium	6010B	1	33	38	145
Cadmium	6010B	1	ND	ND	ND
Chromium	6010B	2	7	10	10
Lead	6010B	20	-	-	129
Lead	7421	1	9	9	-
Mercury	7471A	0.2	ND	ND	ND
Selenium	7740	1	ND	ND	ND
Silver	6010B	2	ND	ND	ND

Approved By: [signature] Date: 3/12/99

3S30EPA/102094
01360ICP.JC1 - Sample (2) 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99
		Date Extracted:	3/9/99

Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

		Sample Name:	**TP6 (6')**	**TP7 (1.5')**	**TP7 (4')**
		Lab Code:	K9901360-009	K9901360-010	K9901360-011
		Date Analyzed:	3/10/99	3/10/99	3/10/99
Analyte	**EPA Method**	**MRL**			
Arsenic	7060A	1	9	7	8
Barium	6010B	1	154	470	228
Cadmium	6010B	1	6	ND	2
Chromium	6010B	2	42	4	7
Lead	6010B	20	376	-	364
Lead	7421	1	-	21	-
Mercury	7471A	0.2	ND	ND	ND
Selenium	7740	1	ND	ND	ND
Silver	6010B	2	ND	ND	ND

Approved By: [signature] Date: 3/12/99

3S30EPA/102094
01360ICP.JC1 - Sample (3) 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/9/99

Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

		Sample Name:	**TP11 (1')**	**TP11 (3')**	**DW-5'**
		Lab Code:	K9901360-015	K9901360-016	K9901360-017
		Date Analyzed:	3/10/99	3/10/99	3/10/99
Analyte	**EPA Method**	**MRL**			
Arsenic	7060A	1	5	10	10
Barium	6010B	1	180	130	56
Cadmium	6010B	1	ND	2	ND
Chromium	6010B	2	8	10	9
Lead	6010B	20	174	543	54
Lead	7421	1	-	-	-
Mercury	7471A	0.2	ND	0.3	ND
Selenium	7740	1	ND	ND	ND
Silver	6010B	2	ND	ND	ND

Approved By: _[signature]_ Date: 3/12/99

3S30EPA/102094
01360ICP.JC1 - Sample (4) 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA
Date Extracted: 3/9/99

Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

		Sample Name:	**Method Blank**
		Lab Code:	K9901360-MB
		Date Analyzed:	3/10/99
Analyte	**EPA Method**	**MRL**	
Arsenic	7060A	1	ND
Barium	6010B	1	ND
Cadmium	6010B	1	ND
Chromium	6010B	2	ND
Lead	6010B	20	ND
Lead	7421	1	ND
Mercury	7471A	0.2	ND
Selenium	7740	1	ND
Silver	6010B	2	ND

Approved By: [signature] Date: 3/12/99

3S30EPA/102094
01360ICP.JC1 - Sample (5) 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99
		Date Extracted:	3/8/99
		Date Analyzed:	3/10-12/99

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.05	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
TP1 (5')	K9901360-001	ND	ND	ND	ND	ND
TP2 (5')	K9901360-002	ND	ND	ND	ND	ND
TP2 (10')	K9901360-003	ND	0.1	ND	0.1	ND
TP3 (5')	K9901360-004	ND	ND	ND	ND	ND
TP4 (4')	K9901360-005	ND	ND	0.2	2.5	430
TP5 (5')	K9901360-006	ND	ND	3.4	4.2	17
TP5 (8')	K9901360-007	ND	ND	ND	ND	ND
TP6 (1.5')	K9901360-008	ND	ND	0.1	0.5	93
TP6 (6')	K9901360-009	ND	ND	ND	ND	7
TP7 (1.5')	K9901360-010	ND	ND	ND	ND	ND
TP7 (4')	K9901360-011	ND	0.1	ND	0.3	9
TP9 (2')	K9901360-012	ND	ND	ND	ND	4
TP10 (5')	K9901360-013	ND	ND	ND	ND	ND
TP10 (8')	K9901360-014	ND	ND	ND	ND	ND
TP11 (1')	K9901360-015	ND	0.1	ND	0.4	15
TP11 (3')	K9901360-016	ND	0.3	ND	0.5	8
DW-5'	K9901360-017	ND	ND	ND	ND	ND

Approved By: Greg Holt Date: 3-12-99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Extracted:	3/8/99
		Date Analyzed:	3/10-12/99

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.05	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
Method Blank	K990310-MB	ND	ND	ND	ND	ND
Method Blank	K990311-MB1	ND	ND	ND	ND	ND
Method Blank	K990311-MB2	ND	ND	ND	ND	ND
Method Blank	K990312-MB	ND	ND	ND	ND	ND

Approved By: Mary Tholt Date: 3-12-99

5A/1081360VOA.MB2 - GBTXs 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP2 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-002	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Ronda Neuneker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP2 (10')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Linda Neunaker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP3 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-004	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Linda Mirancla Date: 3-12-99

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01360SVG.JG1 - 4 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP5 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-006	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Linda Neuneker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP5 (8')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-007	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Londa Meunicker Date: 3-12-99

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name: TP6 (1.5')
Lab Code: K9901360-008
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Yonda Neuneker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP6 (6')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-009	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Vonda Heeneker Date: 3-12-99

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP7 (1.5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-010	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Linda Neuneker Date: 3-12-99

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP7 (4')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-011	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Linda Neunecker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP11 (1')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-015	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Ronda C. Jeuneter Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	TP11 (3')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-016	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	

Approved By: Wonda Heuneker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Polychlorinated Biphenyls (PCBs)

Sample Name:	DW-5'	Units:	mg/Kg (ppm)
Lab Code:	K9901360-017	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/11/99	ND	

Approved By: Wonda Neuneker Date: 3-12-99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA

Polychlorinated Biphenyls (PCBs)

Sample Name: Method Blank
Lab Code: K990308-MB
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1221	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1232	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1242	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1248	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1254	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	
Aroclor 1260	EPA 3540C	8082	0.1	1	3/8/99	3/10/99	ND	

Approved By: Ronda Neuneker Date: 3-12-99

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01360SVG.JG1 - MB 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP1 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/10/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP1 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-001	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C (Hernes Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP2 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-002	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: TP2 (5')
Lab Code: K9901360-002
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP2 (10')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0 3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP2 (10')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C. Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP3 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-004	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/10/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C(Harris Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP3 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-004	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: CClloms Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP5 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-006	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/10/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	[illegible]	3/8/99	3/10/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	[illegible]	3/8/99	3/10/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	[illegible]	3/8/99	3/10/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP5 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-006	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: CCWaines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: TP5 (8')
Lab Code: K9901360-007
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/10/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: CHaines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP5 (8')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-007	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: TP6 (1.5')
Lab Code: K9901360-008
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: CCHaines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP6 (1.5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-008	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP6 (6')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-009	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C (Haines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP6 (6')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-009	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP7 (1.5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-010	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C. Haines   Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP7 (1.5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-010	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: TP7 (4')
Lab Code: K9901360-011
Test Notes: C

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	0.6	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	

C The MRL is elevated because the sample required diluting.

Approved By: CCHaines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP7 (4')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-011	Basis:	Dry
Test Notes:	C		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	1.0	
Anthracene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	0.7	
Pyrene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	0.7	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	4	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	0.6	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.6	1	3/8/99	3/11/99	ND	

C The MRL is elevated because the sample required diluting.

Approved By: CHaines Date: MAR 12 1999

1S2p/052595

01360SVM.AY4 - 11 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: TP9 (2')
Lab Code: K9901360-012
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: CClaines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP9 (2')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-012	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C. Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP10 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-013	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C (Lhines Date: MAR 12 1999

01360SVM.AY4 - 13 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	DW-5'	Units:	mg/Kg (ppm)
Lab Code:	K9901360-017	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: Uandaw Date: 3/12/99

1S22 052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	K980308-SB	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: *[signature]* Date: 3/12/99

1S22 052505

013o0PHC.LL1 - blk 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99
		Date Extracted:	3/8/99
		Date Analyzed:	3/9-12/99

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel and Oil

Prep Method:	METHOD	Units:	PERCENT
AnalysisMethod:	W/TPH-D	Basis:	NA

Sample Name	**Lab Code**	**Test Notes**	**Percent Recovery** o-Terphenyl
TP1 (5')	K9901360-001		94
TP2 (5')	K9901360-002		84
TP2 (10')	K9901360-003		84
TP3 (5')	K9901360-004		87
TP4 (4')	K9901360-005		NA
TP5 (5')	K9901360-006		84
TP5 (8')	K9901360-007		84
TP6 (1.5')	K9901360-008		87
TP6 (6')	K9901360-009		98
TP7 (1.5')	K9901360-010		90
TP7 (4')	K9901360-011		97
TP9 (2')	K9901360-012		83
TP10 (5')	K9901360-013		94
TP10 (8')	K9901360-014		84
TP11 (1')	K9901360-015		92
TP11 (3')	K9901360-016		86
DW-5'	K9901360-017		92
DW-5'	K9901360-017MS		83
DW-5'	K9901360-017DMS		85
Lab Control Sample	K980308-SL		91
Method Blank	K980308-SB		91

CAS Acceptance Limits: 56-116

NA Not Applicable; see case narrative.

Approved By: uandaw Date: 3/12/99

SUR1/052595
01360PHC.LL1 - surr 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/9/99

Matrix Spike/Duplicate Matrix Spike Summary
Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name: DW-5'
Lab Code: K9901360-017MS, K9901360-017DMS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

				Spike Level		Sample	Spike Result		Percent Recovery				
Analyte	**Prep Method**	**Analysis Method**	**MRL**	MS	DMS	**Sample Result**	MS	DMS	MS	DMS	CAS Acceptance Limits	**Relative Percent Difference**	**Result Notes**
Diesel	METHOD	W/TPH-D	25	170	160	ND	151	144	89	90	19-145	1	
Lube Oil	METHOD	W/TPH-D	100	170	160	ND	168	162	99	101	50-150	2	

Approved By: nandaw Date: 3/12/99

DMS/052595

01360PHC.LL1 - dms 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
LCS Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA
Date Extracted: 3/8/99
Date Analyzed: 3/9/99

Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name: Lab Control Sample
Lab Code: K980308-SL
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Diesel	METHOD	W/TPH-D	160	114	71	60-120	
Lube Oil	METHOD	W/TPH-D	160	120	75	50-150	

Approved By: ___*[signature]*___ Date: 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/10 - 11/99

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)

Prep Method: EPA 3540C
Analysis Method: 8082

Units: PERCENT
Basis: NA

Sample Name	**Lab Code**	**Test Notes**	**Percent Recovery** Decachlorobiphenyl
TP2 (5')	K9901360-002		97
TP2 (10')	K9901360-003		100
TP3 (5')	K9901360-004		100
TP5 (5')	K9901360-006		99
TP5 (8')	K9901360-007		91
TP6 (1.5')	K9901360-008		103
TP6 (6')	K9901360-009		102
TP7 (1.5')	K9901360-010		104
TP7 (4')	K9901360-011		88
TP11 (1')	K9901360-015		86
TP11 (3')	K9901360-016		93
DW-5'	K9901360-017		105
DW-5'	K9901360-017MS		104
DW-5'	K9901360-017DMS		96
Lab Control Sample	K990308-LCS		100
Method Blank	K990308-MB		94

CAS Acceptance Limits: 42-130

Approved By: Linda Wennekes Date: 3-12-99

SUR1/110697p
01360SVG.JG1 - SUR 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/11/99

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)

Sample Name: DW-5'
Lab Code: K9901360-017MS, K9901360-017DMS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	Percent Recovery CAS Acceptance Limits	Relative Percent Difference	Result Notes
Aroclor 1016	EPA 3540C	8082	0.1	0.67	0.70	ND	0.64	0.68	96	97	36-126	1	
Aroclor 1260	EPA 3540C	8082	0.1	0.67	0.70	ND	0.80	0.79	119	113	30-136	5	

Approved By: Wonda Neunaker Date: 3-12-99

DMS/020597p

01360SVG.JG1 - DMS 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
LCS Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA
Date Extracted: 3/8/99
Date Analyzed: 3/10/99

Laboratory Control Sample Summary
Polychlorinated Biphenyls (PCBs)

Sample Name: Lab Control Sample
Lab Code: K990308-LCS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Aroclor 1016	EPA 3540C	8082	0.65	0.57	88	26-142	
Aroclor 1260	EPA 3540C	8082	0.65	0.72	111	40-139	

Approved By: Donna Wancker Date: 3-12-99

LCS/080797p
01360SVG.JG1 - LCS 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99
		Date Extracted:	3/8/99
		Date Analyzed:	3/10-11/99

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method:	EPA 3550B	Units:	PERCENT
Analysis Method:	8270C	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery 2FPHL	PHLD6	NBZ	2FBPH	246TBPHL	TPH
TP1 (5')	K9901360-001		43	53	69	72	50	89
TP2 (5')	K9901360-002		40	47	62	65	55	79
TP2 (10')	K9901360-003		42	49	64	71	60	88
TP3 (5')	K9901360-004		45	55	71	71	53	80
TP5 (5')	K9901360-006		46	56	74	76	51	91
TP5 (8')	K9901360-007		43	52	69	72	51	82
TP6 (1.5')	K9901360-008		36	45	65	65	44	73
TP6 (6')	K9901360-009		37	48	63	68	51	73
TP7 (1.5')	K9901360-010		34	42	65	64	38	70
TP7 (4')	K9901360-011		47	60	75	90	56	92
TP9 (2')	K9901360-012		43	50	68	72	54	80
TP10 (5')	K9901360-013		46	53	70	76	62	85
TP10 (8')	K9901360-014		44	50	67	72	59	88
TP11 (1')	K9901360-015		41	54	69	75	59	79
	CAS Acceptance Limits:		27-106	30-104	21-115	34-117	18-140	43-159

2FPHL	2-Fluorophenol
PHLD6	Phenol-d6
NBZ	Nitrobenzene-d5
2FBPH	2-Fluorobiphenyl
246TBPHL	2,4,6-Tribromophenol
TPH	p-Terphenyl-d14

Approved By: CCHaines Date: MAR 12 1999

SUR6/052595

01360SVM.AY1 - sur 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99
		Date Extracted:	3/8/99
		Date Analyzed:	3/10-11/99

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method:	EPA 3550B	Units:	PERCENT
Analysis Method:	8270C	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery 2FPHL	PHLD6	NBZ	2FBPH	246TBPHL	TPH
TP11 (3')	K9901360-016		44	52	69	74	59	91
DW-5'	K9901360-017		42	50	66	69	52	78
DW-5'	K9901360-017MS		44	50	70	73	61	87
DW-5'	K9901360-017DMS		45	50	68	74	60	86
Lab Control Sample	KWG9900673-3		49	55	76	82	66	95
Method Blank	KWG9900673-4		47	55	75	79	55	88
	CAS Acceptance Limits:		27-106	30-104	21-115	34-117	18-140	43-159

2FPHL	2-Fluorophenol
PHLD6	Phenol-d6
NBZ	Nitrobenzene-d5
2FBPH	2-Fluorobiphenyl
246TBPHL	2,4,6-Tribromophenol
TPH	p-Terphenyl-d14

Approved By: C Haines Date: MAR 12 1999

SUR6/052596 1360SVM.AY1 - sur (2) 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99
		Date Extracted:	3/8/99
		Date Analyzed:	3/11/99

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	DW-5'	Units:	mg/Kg (ppm)
Lab Code:	K9901360-017MS, K9901360-017DMS	Basis:	Dry
Test Notes:			

										Percent Recovery				
Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Spike Level** MS	**Spike Level** DMS	**Sample Result**	**Spike Result** MS	**Spike Result** DMS		MS	DMS	CAS Acceptance Limits	**Relative Percent Difference**	**Result Notes**
Phenol	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.1	2.1		58	58	29-92	<1	
2-Chlorophenol	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.4	2.3		67	64	35-90	4	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.3	2.2		64	61	30-82	4	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.3	2.2		64	61	19-108	4	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.4	2.4		67	67	33-90	<1	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.7	2.5		75	69	35-108	8	
Acenaphthene	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.5	2.5		69	69	33-107	<1	
4-Nitrophenol	EPA 3550B	8270C	2	3.6	3.6	ND	2.9	2.7		81	75	24-119	7	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	3.6	3.6	ND	3.1	2.8		86	78	40-109	10	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	3.6	3.6	ND	2.8	2.6		78	72	18-108	7	
Pyrene	EPA 3550B	8270C	0.3	3.6	3.6	ND	2.8	2.8		78	78	24-130	<1	

Approved By: C Haines Date: MAR 12 1999

DMS/052595

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
LCS Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA
Date Extracted: 3/8/99
Date Analyzed: 3/10/99

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Lab Control Sample
Lab Code: KWG9900673-3
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Phenol	EPA 3550B	8270C	3.3	2.1	64	32-97	
2-Chlorophenol	EPA 3550B	8270C	3.3	2.3	70	32-105	
1,4-Dichlorobenzene	EPA 3550B	8270C	3.3	2.3	70	29-100	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	3.3	2.3	70	26-112	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	3.3	2.5	76	31-109	
4-Chloro-3-methylphenol	EPA 3550B	8270C	3.3	2.5	76	31-121	
Acenaphthene	EPA 3550B	8270C	3.3	2.5	76	46-105	
4-Nitrophenol	EPA 3550B	8270C	3.3	2.5	76	21-133	
2,4-Dinitrotoluene	EPA 3550B	8270C	3.3	2.7	82	54-114	
Pentachlorophenol (PCP)	EPA 3550B	8270C	3.3	2.7	82	38-107	
Pyrene	EPA 3550B	8270C	3.3	2.8	85	43-129	

Approved By: C Haines Date: MAR 12 1999

Columbia Analytical Services INC.
An Employee Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K9901360

PAGE 1 OF 2 COC #

PROJECT NAME North BANK -MAlloN Street.
PROJECT NUMBER 149259.AA-04.RP
PROJECT MANAGER Bob Martin
COMPANY/ADDRESS CH2M Hill 9 South Washington
Suite 400, Spokane, WA 99201
PHONE # (509) 747-2000 FAX # (509) 623-1622
SAMPLER'S SIGNATURE Kenneth M. Hoffman

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☒	Volatile Organics 624☐ 8260☐	Pesticide / Herbicides 608☐ 8081☐ 8021☐	Total Toxic Organics (TTO) 608☐ 624☐ 625☐ 8141☐ 8151☐ BTEX☒	PCB AROCLORs 8082	NWTPH - HCID☐ NWTPH-D☒ Dies. Extended NWTPH-G☒	Hydrocarbon Scan☐ O & G☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHs 8310☐ SIM☐	GC/MS-SIM PAH☐ Phenol☐ Phthalates☐	Metals, Total or Dissolved (See list below) Total Lead	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle)	TOC 9020☐ AOX 1650☐ 506☐	Total Metals 8-RCRA				REMARKS
TP1 (5')	3/4/99	13:00	1	S	1	✓	✓				✓					✓									
TP2 (5')	3/4/99	12:40	2	S	1	✓	✓			✓	✓					✓									
TP2 (10')	3/4/99	12:45	3	S	1	✓	✓			✓	✓					✓									
TP3 (5')	3/4/99	12:20	4	S	1	✓	✓			✓	✓					✓									
TP4 (4')	3/4/99	11:50	5	S	1		✓				✓					✓									
TP5 (5')	3/4/99	9:25	6	S	1	✓	✓			✓	✓										✓				
TP5 (8')	3/4/99	9:35	7	S	1	✓	✓			✓	✓										✓				
TP6 (1.5')	3/4/99	9:45	8	S	1	✓	✓			✓	✓										✓				
TP6 (6')	3/4/99	10:10	9	S	1	✓	✓			✓	✓										✓				
TP7 (1.5')	3/4/99	10:45	10	S	1	✓	✓			✓	✓										✓				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

X II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # ____

Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

X 5 Day

___ Standard (10-15 working days)

X Provide FAX Results

3/12/99
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

SPECIAL INSTRUCTIONS/COMMENTS:

All TPH-DX for NWTPH-D

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Ken Hoffman	Signature: [signature]	Signature	Signature
Date/Time: 3/4/99 3:00	Date/Time: 05 MAR 99 1030	Date/Time	Date/Time
Printed Name: Ken Hoffmann	Printed Name: Lori K. Hawn	Printed Name	Printed Name
Firm: LCI	Firm: CAS	Firm	Firm

00099

Columbia Analytical Services INC.
An Employee Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K9901360

PAGE 2 OF 2 COC #

PROJECT NAME: North Bank - Mallow Street

PROJECT NUMBER: 149259.AA-04.RP

PROJECT MANAGER: Bob Martin

COMPANY/ADDRESS: CH2MHill 9 South Washington, Suite 400 Spokane, WA 99201

PHONE #: (509) 747-2000 FAX #: (509) 623-1622

SAMPLER'S SIGNATURE: Ken Hoffmann

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 ☐ 8270 ☒	Volatile Organics 624 ☐ 8260 ☐	Pesticide / Herbicides 608 ☐ 8081 ☐ 8021 ☐ BTEX ☒	Total Toxic Organics (TTO) 608 ☐ 624 ☐ 625 ☐ 8141 ☐ 8151 ☐	PCB AROCLORS 8082	NWTPH - HCID ☐ NWTPH-D ☒ NWTPH-G ☒ Diesel Extended	Hydrocarbon Scan ☐ O & G ☐	Chlorophenolics - 8151M Tri ☐ Tetra ☐ PCP ☐	PAHs 8310 ☐ SIM ☐	GC/MS-SIM PAH ☐ Phenol ☐ Phthalates ☐	Metals, Total or Dissolved (See list below) Total Lead	Cyanide ☐ Hex-Chrom ☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle)	TOC 9020 ☐ AOX 1650 ☐ 506 ☐	Total Metals 8 RCRA				REMARKS
TP7 (4')	3/4/99	10:50	11	S	1	✓	✓			✓	✓										✓				
TP9 (2')	3/4/99	11:10	12	S	1	✓	✓	MS			✓					✓									
TP10 (5')	3/4/99	11:20	13	S	1	✓	✓				✓					✓									
TP10 (8')	3/4/99	11:30	14	S	1	✓	✓				✓					✓									
TP11 (1')	3/4/99	10:55	15	S	1	✓	✓			✓	✓										✓				
TP11 (3')	3/4/99	11:00	16	S	1	✓	✓			✓	✓										✓				
DW-5'	3/4/99	10:30	17	S	1	✓	✓			✓	✓										✓				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

X II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # ____

Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

X 5 Day

___ Standard (10-15 working days)

X Provide FAX Results

3/12/99
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

SPECIAL INSTRUCTIONS/COMMENTS:

All TPH-DX for NWTPH-D

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature: Ken Hoffmann	Date/Time: 3/4/99 3:00	Signature: [illegible]	Date/Time: 05 MAR 99 1030	Signature	Date/Time	Signature	Date/Time
Printed Name: Ken Hoffmann	Firm: LCI	Printed Name: Lori K. Hamm	Firm: CAS	Printed Name	Firm	Printed Name	Firm

00100

Columbia Analytical Services Inc.
Cooler Receipt And Preservation Form

Project/Client CH2M HILL Work Order K99 1360

Cooler received on 3/5/99 and opened on 3/5/99 by [illegible]

1. Were custody seals on outside of cooler? YES NO
   If yes, how many and where? —
2. Were seals intact and signature & date correct? ~~YES NO~~
3. COC # ___ ___ ___ ___ ___
   Temperature of cooler(s) upon receipt: 6.8 ___ ___ ___ ___
   Temperature Blank: 2.8 ___ ___ ___ ___
4. Were custody papers properly filled out (ink, signed, etc.)? YES NO
5. Type of packing material present PEANUTS, B. WRAP
6. Did all bottles arrive in good condition (unbroken)? YES NO
7. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? YES NO
8. Did all bottle labels and tags agree with custody papers? YES NO
9. *Were the correct types of bottles used for the tests indicated? YES NO*
10. Were all of the preserved bottles received at the lab with the appropriate pH? ~~YES NO~~
11. Were VOA vials checked for absence of air bubbles, and if present, noted below? ~~YES NO~~
12. Did the bottles originate from CAS/K or a branch laboratory? ___ YES NO

Explain any discrepancies ___

Samples that required preservation or received outside of temperature range at the lab(circle)

Sample ID	Reagent	Volume	Lot Number	Initials

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP10 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-013	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3		3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C(Harris Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP10 (8')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-014	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP10 (8')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-014	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP11 (1')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-015	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.4	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP11 (1')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-015	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.5	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.4	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.3	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.3	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: TP11 (3')
Lab Code: K9901360-016
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/11/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C (Haines Date: MAR 12 1999

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	TP11 (3')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-016	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.8	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.9	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.9	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/11/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.4	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.4	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	0.4	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/11/99	ND	

Approved By: C(Harris Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	DW-5'	Units:	mg/Kg (ppm)
Lab Code:	K9901360-017	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/10/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: CC Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	DW-5'	Units:	mg/Kg (ppm)
Lab Code:	K9901360-017	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	KWG9900673-4	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Aniline	EPA 3550B	8270C	1	1	3/8/99	3/10/99	ND	
Bis(2-chloroethyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Phenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,3-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,2-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
1,4-Dichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzyl Alcohol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachloroethane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
N-Nitrosodi-n-propylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3- and 4-Methylphenol Coelution	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Nitrobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Isophorone	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitrophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dimethylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-chloroethoxy)methane	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4-Dichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzoic Acid	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
1,2,4-Trichlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Naphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloroaniline	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobutadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chloro-3-methylphenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Methylnaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorocyclopentadiene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,6-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,4,5-Trichlorophenol	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Chloronaphthalene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Acenaphthylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dimethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
2,6-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Acenaphthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Dibenzofuran	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Nitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2,4-Dinitrotoluene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluorene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Diethyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C C Haines Date: MAR 12 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	KWG9900673-4	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
N-Nitrosodiphenylamine	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Hexachlorobenzene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pentachlorophenol (PCP)	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Phenanthrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-butyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Butyl Benzyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
3,3'-Dichlorobenzidine	EPA 3550B	8270C	2	1	3/8/99	3/10/99	ND	
Benz(a)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Chrysene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Di-n-octyl Phthalate	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(b)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(k)fluoranthene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(a)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Dibenz(a,h)anthracene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	
Benzo(g,h,i)perylene	EPA 3550B	8270C	0.3	1	3/8/99	3/10/99	ND	

Approved By: C Haines Date: MAR 12 1999

APPENDIX A

LABORATORY QA/QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99 .
Date Received: 3/5/99

Duplicate Summary

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TP1 (5')	K9901360-001DUP	3/8/99	94 6	96.1	95.4	1	

Approved By: JC ________________________ Date: 3/9/99

TSOLIDS.XLT_DUP/09291998a

01360TS.AG1 - DUP 3/9/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/9/99
Date Analyzed: 3/10/99

Duplicate Summary
Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: TP11 (1')
Lab Code: K9901360-015

Analyte	**EPA Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**
Arsenic	7060A	1	5	5	5	<1
Barium	6010B	1	180	148	164	20
Cadmium	6010B	1	ND	ND	ND	-
Chromium	6010B	2	8	8	8	<1
Lead	6010B	20	174	151	162	14
Lead	7421	1	182	145	164	23
Mercury	7471A	0.2	ND	ND	ND	-
Selenium	7740	1	ND	ND	ND	-
Silver	6010B	2	ND	ND	ND	-

Approved By: ______ Date: 3/12/99

DUP1SEPA/102194

01360ICP.JC1 - DUP 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/9/99
Date Analyzed: 3/10/99

Matrix Spike Summary
Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: TP11 (1')
Lab Code: K9901360-015

Analyte	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**
Arsenic	1	9	5	12	78	60-130
Barium	1	450	180	574	88	75-125
Cadmium	1	11	ND	12	109	75-125
Chromium	2	45	8	58	111	75-125
Lead	20	110	174	305	119	75-125
Lead	1	4	182	188	NA	60-130
Mercury	0.2	0.4	ND	0.4	100	60-130
Selenium	1	2	ND	2	100	60-130
Silver	2	11	ND	11	100	75-125

Approved By: ________ Date: 3/12/99

MS1S/102194
01360ICP.JC1 - Spike 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
LCS Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA
Date Analyzed: 3/10/99

Laboratory Control Sample Summary
Total Metals
Units: mg/Kg (ppm)

Source: ERA Priority Pollutant/CLP Inorganic Soils

Analyte	EPA Method	True Value	Result	Control Limits
Arsenic	7060A	82.4	69.5	50.9-114
Barium	6010B	106	88.7	59.7-152
Cadmium	6010B	71.1	70.5	39.3-103
Chromium	6010B	76.4	73.6	53.0-99.9
Lead	6010B	147	145	88.1-206
Lead	7421	190	146	114-267
Mercury	7471A	1.34	1.27	0.662-2.02
Selenium	7740	113	91.0	73.6-151
Silver	6010B	131	123	74.1-188

Approved By: [signature] Date: 3/12/99

LCSEPA/102194
01360ICP.JC1 - ERA 230 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project:
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/10-12/99

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
TP1 (5')	K9901360-001	91	90
TP2 (5')	K9901360-002	83	81
TP2 (10')	K9901360-003	89	88
TP3 (5')	K9901360-004	89	85
TP4 (4')	K9901360-005	99	157(A)
TP5 (5')	K9901360-006	100	114
TP5 (8')	K9901360-007	94	88
TP6 (1.5')	K9901360-008	101	235(A)
TP6 (6')	K9901360-009	86	93
TP7 (1.5')	K9901360-010	61	58
TP7 (4')	K9901360-011	65	59
TP9 (2')	K9901360-012	89	84
TP10 (5')	K9901360-013	88	84
TP10 (8')	K9901360-014	88	83
TP11 (1')	K9901360-015	79	79
TP11 (3')	K9901360-016	83	84
DW-5'	K9901360-017	85	81
TP6 (6')	K9901360-009DUP	-	89
DW-5'	K9901360-017DUP	-	84
	CAS Acceptance Limits:	52-123	48-129

A Outside acceptance limits; see case narrative.

Approved By: [signature] Date: 3-13-99

SUB2/111594 01360VOA.MB1 - GBTXsSUR 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/10-12/99

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
DW-5'	K9901360-017MS	83	-
DW-5'	K9901360-017DMS	90	-
Lab Control Sample	K990310-LCS	-	111
Method Blank	K990310-MB	91	85
Method Blank	K990311-MB1	90	84
Method Blank	K990311-MB2	-	82
Method Blank	K990312-MB	-	90
	CAS Acceptance Limits:	52-123	48-129

Approved By: Greg Holk Date: 3-12-99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/10/99

Duplicate Summary
Total Petroleum Hydrocarbons as Gasoline
Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: TP6 (6')
Lab Code: K9901360-009DUP

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	CAS RPD Acceptance Limit
Gasoline	5	7	5	6	33	40

Approved By: Molly Holt Date: 3-12-99

DUP/SRPD/102494 - GBTXsDUP 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99
Date Extracted: 3/8/99
Date Analyzed: 3/11/99

Duplicate Summary
Total Petroleum Hydrocarbons as Gasoline
Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: DW-5'
Lab Code: K9901360-017DUP

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	CAS RPD Acceptance Limit
Gasoline	5	ND	ND	-	NC	40

Approved By: [signature] Date: 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
LCS Matrix: Soil

Service Request: K9901360
Date Collected: NA
Date Received: NA
Date Extracted: 3/8/99
Date Analyzed: 3/10/99

Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Gasoline
Washington DOE Method WTPH-G
Units: mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
TPH as Gasoline	50	53	106	82-155

Approved By: Greg Hoyt Date: 3-12-99

LCS/102194
01360VOA.MB2 - GBTXsLCS 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP1 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: Nandaur Date: 3/12/99

1S22 052595

01360PHC.LL1 - 1 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP2 (5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-002	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	30	O
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	202	

O   Quantitated as diesel. The sample contained an oil component that partially eluted in the diesel range.

Approved By: ____________ Date: 3/16/99

1S22/052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP2 (10')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	67	O
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	268	

O Quantitated as diesel. The sample contained an oil component that partially eluted in the diesel range.

Approved By: nandaw Date: 3/12/99

1S22 052595

013o0PHC.LL1 - 3 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP5 (8')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-007	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: ~~~~~~~~ Date: 3/12/99

1S22/052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99.
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP6 (1.5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-008	Basis:	Dry
Test Notes:			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: ________ Date: 3/12/99

1S22/052595

013o0PHC.LL2 - 8 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name: TP6 (6')
Lab Code: K9901360-009
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: [signature] Date: 3/12/99

1S22 052595

01360PHC.LL2 - 9 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP7 (1.5')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-010	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	45	N
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

N — Quantitated as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Approved By: uandaw Date: 3/12/99

1S22 052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP7 (4')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-011	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/10/99	273	N
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/10/99	685	

N Quantitated as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Approved By: _uadaw_ Date: 3/12/99

1S22'052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP9 (2')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-012	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	ND	

Approved By: Nandant Date: 3/12/99

1S22 052595

013o0PHC.LL3 - 12 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name: TP10 (5')
Lab Code: K9901360-013
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	29	O
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	193	

O Quantitated as diesel. The sample contained an oil component that partially eluted in the diesel range.

Approved By: nandan Date: 3/12/99

1S22/052595

01360PHC.LL3 - 13 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99.
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP10 (8')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-014	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	ND	
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	111	

Approved By: uandaur Date: 3/12/99

1S22 052595

01360PHC.LL3 - 14 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: North Bank - Mallon Street/149259.AA-04.RP
Sample Matrix: Soil

Service Request: K9901360
Date Collected: 3/4/99
Date Received: 3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name: TP11 (1')
Lab Code: K9901360-015
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	333	N
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	782	

N Quantitated as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Approved By: Uandaw Date: 3/12/99

1S22 052595

01360PHC.LL3 - 15 3/12/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9901360
Project:	North Bank - Mallon Street/149259.AA-04.RP	**Date Collected:**	3/4/99
Sample Matrix:	Soil	**Date Received:**	3/5/99

Total Petroleum Hydrocarbons as Diesel and Oil

Sample Name:	TP11 (3')	Units:	mg/Kg (ppm)
Lab Code:	K9901360-016	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Diesel	METHOD	W/TPH-D	25	1	3/8/99	3/9/99	35	N
Oil Misc.	METHOD	W/TPH-D	100	1	3/8/99	3/9/99	103	

N	Quantitated as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Approved By: Uendaw Date: 3/12/99

1S22/052595

ATTACHMENT D

Focused Subsurface Investigation, CH2M November 1999

Technical Memorandum

Focused Subsurface Investigation Report of Findings "Howard Street Property"

Prepared for

City of Spokane
Department of Parks and Recreation

November 1999

CH2MHILL

Focused Subsurface Investigation Report of Findings "Howard Street Property"

PREPARED FOR: City of Spokane
Department of Parks and Recreation

PREPARED BY: CH2M HILL Spokane

COPIES: Perron Collaborative

DATE: November 2, 1999

1.0 Introduction

This technical memorandum presents results and conclusions from an August 1999 subsurface investigation of selected areas within the Howard Street Property under consideration for purchase by the City of Spokane (the City). At the City's request, CH2M HILL, under subcontract to the Perron Collaborative completed a focused subsurface investigation of two selected parcels, referred to herein as the Dairy Garage Area and the Former Railroad Yard. This supplemental investigation was conducted in response to the Washington State Department of Ecology (Ecology) comments and input from their review of two environmental assessment reports (Phase I and II) that had previously been prepared for the subject property. The scope of the current investigation was further refined during a team meeting between Ecology, CH2M HILL, Perron Collaborative, and the City on August 11, 1999.

1.1 Purpose and Objectives

The purpose of this supplemental investigation was to generate additional subsurface data to address data gaps made apparent by the Phase II investigation. These recent findings, together with information from the Phase I and II assessments, support the City's development of an appropriate remedial strategy to address environmental conditions at the site. The specific objectives were as follows:

1. Better characterize subsurface soil and groundwater conditions immediately west of the Dairy Garage Building.
2. Assess whether hazardous substances are present in the shallow groundwater (where present) underlying the Diary Garage area.
3. Assess whether hazardous substances are present in shallow soils overlying the basalt bedrock on the former Railroad Yard adjacent to the former Van Waters chemical storage facility yard (current Central Park Maintenance yard).

The subsurface investigation included geologic logging of borehole observations, collection of soil and borehole water samples, and chemical analysis of soil and groundwater samples to determine the presence of hazardous substances in these particular site media.

2.0 Background

2.1 Site Description

The Howard Street Properties, herein referred to as the "project area," consists of a private commercial properties north and south of Cataldo Street between Washington Street and Howard Street. The project area is located in the Southwest Quarter of the Northeast Quarter of Section 18, Township 25 North, Range 43 East (W.M.) in Spokane County, Washington. A vicinity map is provided as Figure 1. The greater surrounding land uses include commercial businesses, roadways, city parks, and public structures.

The project area is located on moderate sloping terrain. In general, the site topography slopes to the south, towards the north bank of the Spokane River. The original surface topography has been modified by previous development activities. In some areas imported fill materials have been used to level the steeper gradients. Historical site development includes both the construction and demolition of commercial and residential buildings and the former presence of a major, east-to-west railroad right-of-way (R/W) serving commercial/industrial operations on the north bank of the Spokane River. The river bed lies approximately 40 feet below the site in elevation. The average site elevation is approximately 1,900 feet NGVD (1929).

Local geologic maps report the project area to be immediately underlain by a relatively thin mantle of Pleistocene-age glacial flood deposits. These medium to coarse textured materials include a poorly sorted, stratified mixture of boulders, cobbles, gravel, and sand resulting from multiple episodes of catastrophic outbursts from glacial-dammed lakes northeast of the area (DNR Geologic Map GM-39, 1991). Basalt bedrock, belonging to the Miocene-age Columbia River Group, underlies the site and outcrops are visible. In general, the basalt flows are several hundred feet thick in this area. No surface water bodies, wetland-type conditions, or similar sensitive environments were observed within or adjacent to the project area properties (aside from the Spokane River and its floodplain).

The unconfined Spokane Aquifer is not present beneath the project area. However, the project area is located within the Spokane Aquifer Sensitive Area (ASA) of the Spokane Aquifer, but not within the Spokane Aquifer Boundary (USGS, 1987).

Local native soils are classified as Hesseltine silt loam unit (USDA, 1968). The Hesseltine silt loam consists of well-drained, medium-textured soils underlain by sand, gravel, and cobblestones. These soils are formed in glacial outwash mixed with volcanic ash and loess. Soils observed in the project area appear to be imported backfill of variable composition, composed primarily of sand to gravel sized rock fragments.

2.2 Site History and Land Use

The boundaries of the Howard Street Property are shown in Figure 2. The specific areas of investigation were the Dairy Garage area and the Railroad Yard area.

Figure 1

Vicinity Map

Howard Street Property

CH2MHILL

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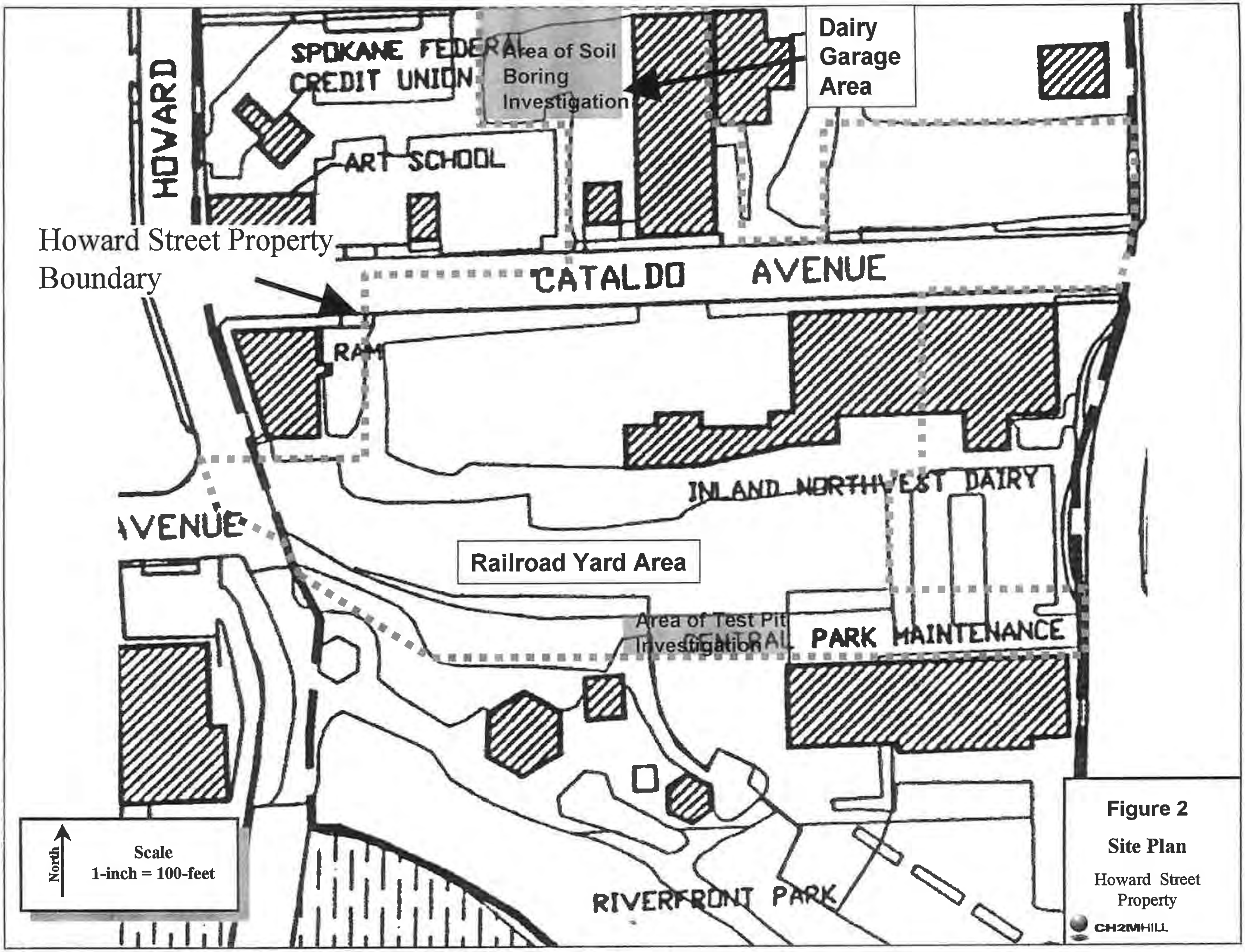


Figure 2

Site Plan

Howard Street Property

The Dairy Garage area consists of two buildings and an open area currently used for parking and is accessed from Cataldo Avenue. The larger of the two buildings is a garage structure built in 1914 and has approximately 15,000 square feet on the first floor, with a full basement. The garage structure is constructed from brick and has a flat tar and gravel roof. The garage structure has a main entrance on Cataldo Avenue, however a large bay door is also located on Dean Avenue. The smaller of the two buildings is a former office building currently used for storage. The parking area formerly included two 10,000-gallon underground storage tanks containing diesel and gasoline fuel. Both tanks were removed in 1989, over-excavated to removing fuel impacted soil, and backfilled to approximate surface grade.

The Railroad Yard area is an unimproved lot and currently is used for parking. Access to the parking area is from Howard Street to the west. This parking area was the former location of a railroad switching yard taken out of service in the early 1970s.

2.3 Previous Assessments

In April 1999, CH2M HILL conducted a *Phase II Environmental Site Assessment Limited Subsurface Exploration of the "Howard Street Property"* to assess areas of potential environmental liability that had been identified during a previous *Phase I Environmental Site Assessment* (November 1998) prepared by Leppo Consultants, Inc. The Phase I Assessment was prepared to assist the City with the potential purchase of the Howard Street Property from the Owner, Inland Northwest Dairies. The Phase II Assessment was limited to the buildings and above ground improvements and the shallow subsurface soils above the basalt bedrock surface. Evaluation of groundwater was not included in the Phase II Assessment as no groundwater was anticipated or encountered above the basalt bedrock. The assessment work focused on three general areas: 1) the Dairy Garage area, 2) the Dairy Processing Area, and 3) the Former Railroad Area. The other areas within the Master Planning area were not included in the Phase II Environmental Site Assessment (ESA) and are not included in this scope of work.

Field exploration activities included site reconnaissance (including an inventory of chemical containers and visual identification of suspected asbestos containing materials) excavation of 11 test pits, and collection of 17 soil samples for laboratory analytical testing. The test pit observations and analytical testing results confirmed the presence of lead concentrations in soils near the Dairy Garage that were above the MTCA Method A cleanup level for both general and industrial soils. A test pit excavated on the east side of the dairy garage building encountered elevated petroleum hydrocarbon soil concentrations above the MTCA Method A cleanup levels for general and industrial soils. Lead and cadmium were detected in backfill material from the railroad yard area at levels slightly above the MTCA Method A cleanup levels for soil, but lower than the cleanup levels for industrial soil. Refractory heavy petroleum hydrocarbons (diesel and oil) were detected in these soils at levels exceeding the MTCA Method A cleanup level; low levels of polynuclear aromatic hydrocarbons (PAHs) also were detected. None of the findings from the Phase II assessment suggested the presence of gross chemical contamination that would constitute an imminent threat to human health or the environment requiring immediate corrective actions. The inspection results of the dairy garage building, dairy garage office, and dairy processing facility indicated the presence of suspected asbestos containing material.

The results of the Phase I and Phase II Environmental Site Assessment reports were submitted to Ecology for review and input as part of the Voluntary Cleanup Program on July 16, 1999. In a letter dated August 10, 1999, Ecology concluded that additional investigation was necessary to more fully characterize site conditions and the potential presence of hazardous substances on the Dairy Garage property caused by historical releases.

As part of previous investigations, requests were made of the property owner, Inland Northwest Dairies, for copies of previously conducted assessments that may have been done on the property. Inland Northwest Dairies indicated that at least one underground storage tank (UST) had been removed in the early 1990's but no other environmental assessment documentation was available.

During review of Ecology records, conducted as part of the Phase I investigation, a correspondence (dated June 22, 1990) was found from Dunn, Carney, Allen, Higgins & Tongue, Attorneys at Law, representing the Carnation Company, addressed to the Department of Ecology. The correspondence appeared to be in response to a letter submitted by the Department of Ecology to Dunn, Carney, Allen, Higgins & Tongue regarding a notification of leaking underground storage tanks made by Anania Geologic Engineering, dated August 22, 1989. The June 22, 1990 correspondence summarized the excavation, removal, and subsurface sampling conducted as part of an underground fuel tank removal. The fuel tanks were located at the former Dairy Garage area, in the parking area west of the existing building. Attachments to the correspondence included six figures that had been prepared by Anania Geologic Engineering, showing the tank locations, excavation area, soil borings, and geologic cross sections displaying soil analytical results. The figures show two 10,000 gallon storage tanks, one gasoline and one diesel, located west of the Vehicle Maintenance Building (Dairy Garage). Shallow groundwater was encountered in the investigation borings at a depth of approximately 25 feet below ground surface (bgs). This shallow groundwater likely was perched on basalt bedrock.

During their review of the Howard Street property Phase I & II ESA reports, Ecology examined historical agency files on the Howard Street properties. Copies of these documents were provided to the City, and included Ecology correspondence with property owners, filed complaints, investigation reports, requests for public records, and environmental assessment reports. These records primarily addressed operations at the former Dairy Garage area, UST removal and remediation conducted adjacent and west of the garage building, and removal of above ground storage tanks (AST) in the garage building's southeast corner. Ecology issued a letter (dated August 7, 1990) stating that the most severely contaminated soil had been removed during the UST excavation and removal. With respect to the ASTs, Ecology determined that the probability for AST-related soil contamination was low following action taken in 1996.

3.0 Subsurface Investigation Activities

The recent investigation activities were focused on two site areas: the parking area west of the former Dairy Garage and the southern boundary of the former railroad yard associated with operations at the former Van Waters Chemical Storage facility (Figure 2). Three soil borings were advanced west and southwest of the Dairy Garage area (former UST site) to assess the occurrence and quality of shallow groundwater. The three soil borings were advanced through unconsolidated sand and gravel materials in the area where previous investigations identified the presence of a buried bedrock trough. Test pits were excavated in an area adjacent to the former Van Waters facility to assess the potential occurrence of volatile organic compounds and selected heavy metals in shallow subsurface soils. The test pit and soil boring locations are shown on Figures 3 and 4, respectively. Details of these investigation activities are presented below.

3.1 Test Pits

The subsurface exploration and soil sampling was initiated and completed on August 24, 1999. Three test pits were excavated at the property boundary, from the edge of the warehouse building to the existing park area. This area roughly correlates with the historic location of storage tanks outside the building. Test pit TP-1 was excavated approximately 8 feet north and 18 feet west of the existing building corner (Figure 3). Test pits TP-2 and TP-3 were excavated approximately 25 feet and 30 feet further west, respectively.

Test pits were excavated by Budinger & Associates of Spokane, Washington, a licensed contractor, using a Case 580 backhoe. Test pits TP-1, -2, and –3 were excavated to the approximate basalt bedrock surface, which was encountered, respectively, at depths of 10, 7, and 4 feet bgs. The plan view dimensions of each test pit measured approximately 3 by 8 feet. A CH2M HILL environmental geologist was onsite during excavation to record observations (staining, color, sheen, odors), log the soils in accordance with USCS protocols, and collect soil samples for chemical analysis. Mr. Guy Gregory of Ecology also was onsite to observe the excavation operations.

Four soil samples were collected from the three test pits, taken directly from the backhoe bucket. Two samples were collected from the deepest pit, TP-1 at depths of 5 feet and 10 feet. One sample each was collected from TP-2 and TP-3, at 7 feet and 4 feet respectively. Test pit logs are presented in Appendix A.

Samples were placed in laboratory provided containers and immediately transferred into an iced cooler (4 degrees Celsius) for transport to the analytical laboratory. Samples were submitted under chain of custody protocols to Columbia Analytical Services, Inc. of Kelso, Washington. The samples were analyzed for Volatile Organics by GCMS (EPA method 8260) and Total Metals Lead and Cadmium (EPA method 6010B). The chain of custody, analytical reports, and quality control report are included in Appendix B.

Immediately after collection of soil samples, the test pits were backfilled using wheel roll and bucket compaction methods to the approximate surface grade. Test pits were not left open or unsupervised during the investigation due to the accessible nature of the site and the presence of pedestrian traffic.

3.2 Soil Borings

Groundwater exploration and sampling was conducted on August 23 through August 24, 1999. Budinger & Associates of Spokane, Washington, a licensed drilling contractor, advanced soil borings using a Mobile B-57 truck mounted hollow stem auger rig. Soil boring SB-1 was advanced approximately 30 feet west of the former garage building

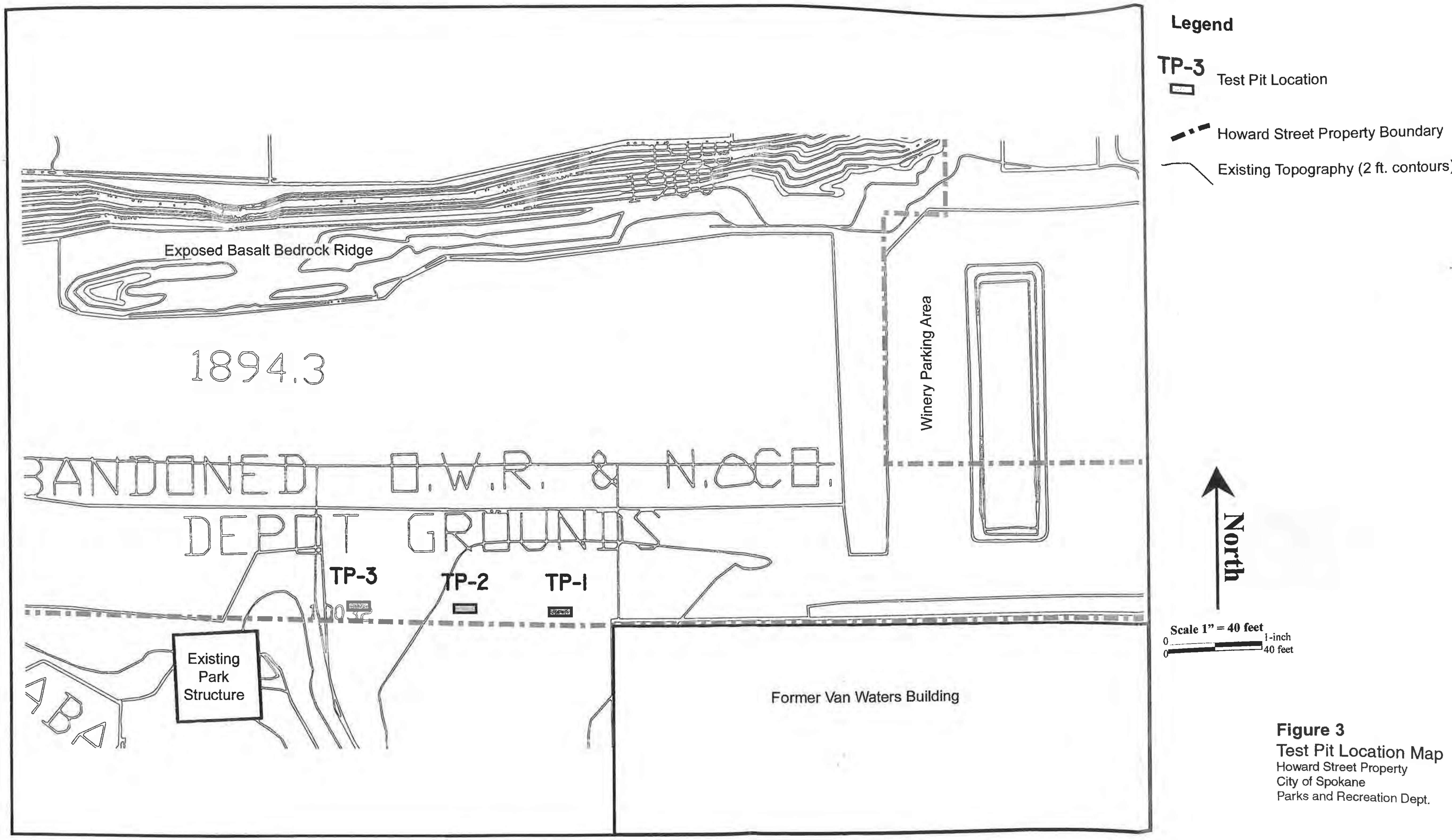


Figure 3
Test Pit Location Map
Howard Street Property
City of Spokane
Parks and Recreation Dept.

CH2MHILL

and is located at the eastern edge of the bedrock trough (Figure 4). Soil boring SB-2 was advanced approximately 40 feet southwest of SB-1 in a basin-like structure indicated in the bedrock topography. Soil boring SB-3 was advanced approximately 40 feet southwest of soil boring SB-2 within the bedrock trough and close to a swale and drywell located offsite to the south; the swale receives runoff from an adjacent asphalt covered parking lot.

A CH2M HILL environmental geologist was onsite during the drilling to log the soils in accordance with USCS protocols, record observations (staining, color, sheen, odors) and collect groundwater samples from the temporary cased boreholes. General soil characteristics were interpreted from drill cuttings and rig response to advancement. Depth to water level was measured from approximate ground surface, and relative elevations were established for soil borings were surveyed for water level comparison between soil boring locations. Mr. Guy Gregory of Ecology conducted site visits during drilling and sampling operations.

The three soil borings were successfully advanced to a depths ranging from 26 to 31 feet bgs. An extensive cobble layer was encountered in all three borings at approximately 13 feet bgs. Often more than one attempt was necessary to advance the borehole through this cobble layer in order to reach the underlying basalt bedrock interface. Soil boring logs are presented in Appendix A. The soil boring locations are shown on Figure 4.

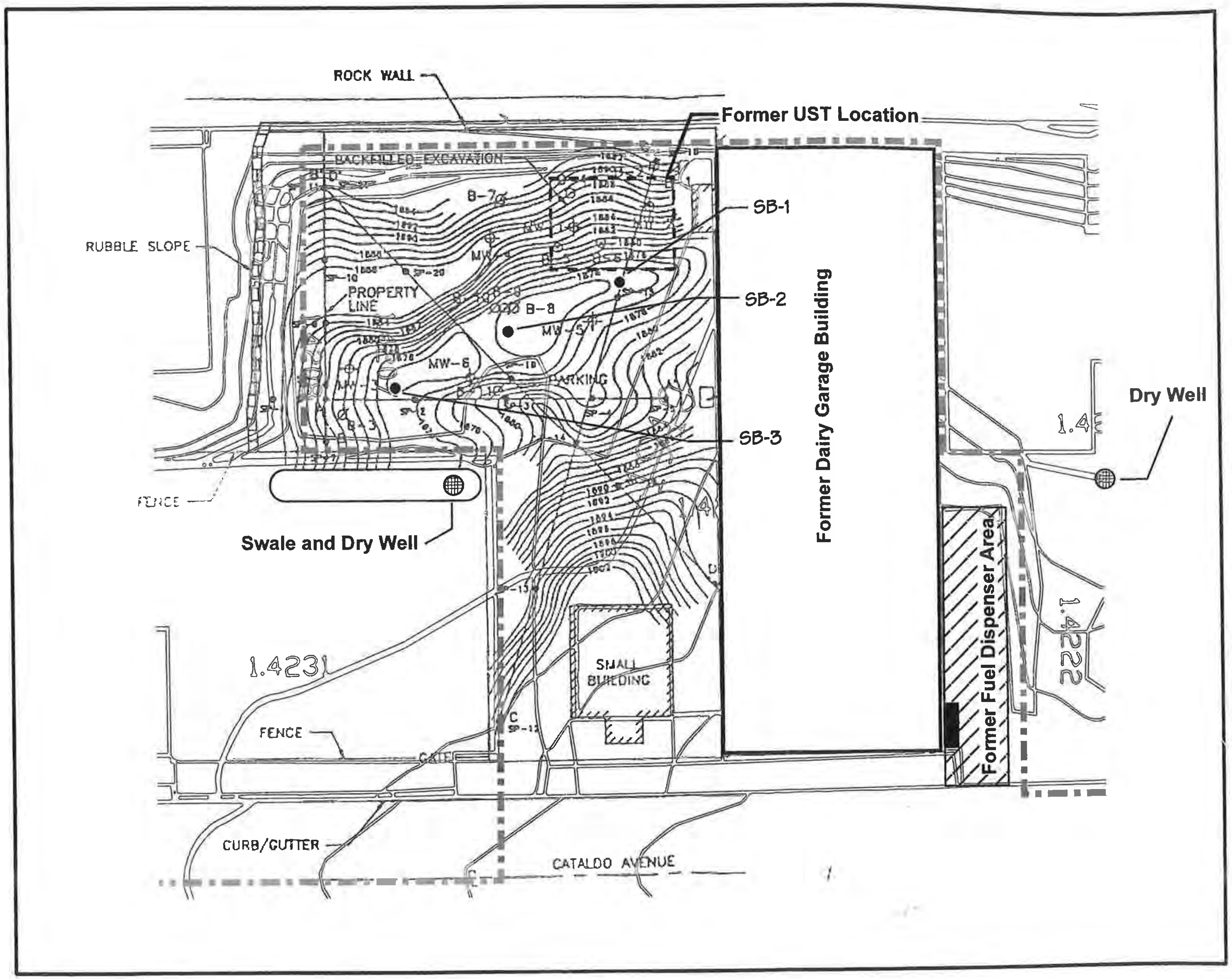
Groundwater was encountered in two of the soil borings, SB-2 and SB-3. Groundwater samples were collected from the soil boring through the installation of temporary 2-inch diameter PVC well casing and screen. The screen and blank casing were lowered through the augers to the bottom of the boring and a five foot section of auger was withdrawn from the borehole, exposing the screen to the formation. Prior to sampling, the temporary 2-inch diameter well was purged of approximately 5 gallons of water using a 0.7-inch-diameter disposable bailer. Observations of groundwater conditions were noted, including the presence of any odors or colors indicative of potential contamination.

Groundwater samples were retrieved from SB-2 and SB-3 by hand bailing and placed in laboratory provided containers. The two water samples were labeled, dated, and managed under chain of custody protocol. Samples were placed in an iced cooler (4 degrees Celsius) and transported to Columbia Analytical Services, Inc. of Kelso, Washington for chemical analysis. The samples were analyzed for Volatile Organics (EPA method 8260), Semi-Volatile Organics (EPA method 8270), Total Petroleum Hydrocarbons as gasoline (method NWTPH-G), Total Petroleum Hydrocarbons as Diesel and Extended (method NWTPH-DX), and dissolved metal Lead (EPA method 7421). The completed chain of custody, analytical reports, and quality assurance quality control report are included in Appendix B.

Following collection of groundwater grab samples, the three drilled boreholes were abandoned by filling the borehole with (hydrated) bentonite chips.

4.0 Results

This section presents the findings from the focused subsurface investigation activities at the Howard Street Property.



Legend

SB-2 Soil Boring I.D.

● Soil Boring Location

Dry Well

Howard Street Property Boundary

Existing Topography (2 ft. contours)

Bedrock Topography (1 ft. contours)

Note: Source for bedrock topography Anania Geologic Engineering report dated April 24, 1990. Source for surface topography City of Spokane Parks and Recreation Dept.

North

Scale 1" = 40 feet

0 1-inch

0 40 feet

Figure 4
Soil Boring Location Map

Howard Street Property
City of Spokane
Parks and Recreation Dept.

CH2MHILL

4.1 Test Pits

4.1.1 Lithology

Soils encountered in the three test pits were comprised of two visually distinct strata. The upper 2 feet of soil consisted of a dark brown, moderately compacted, poorly graded sandy gravel. Some red brick was evident in the upper two feet and likely represents miscellaneous backfill material. Below the two foot layer, the soils typically were a light brown, less compacted, poorly graded sandy gravel. The depth to the bedrock interface generally decreased from east to west. Visual and/or olfactory indications of soils contamination (including staining or evident odors) were not observed in the test pits during excavation. The soils encountered in the test pits were dry and no evidence of groundwater was observed.

4.1.2 Chemistry

The four test pit soil samples were submitted for chemical analysis of Volatile Organic Compounds (VOCs) and total lead and cadmium. Samples from test pits TP-1 and TP-3 showed no detectable VOCs. Three VOCs were detected in the sample from test pit TP-2: ethylbenzene at 1 mg/kg, styrene at 1 mg/kg, and toluene at 2 mg/kg. These concentrations are relatively low, at or near the method reporting limit for the constituents detected.

All four samples were non-detect for cadmium. Samples from TP-1 showed no detectable lead, while samples from test pits TP-2 and TP-3 contained lead at levels of 28 mg/kg and 70 mg/kg, respectively. These detections are relatively low, below the MTCA Method A (residential) cleanup level of 250 mg/kg.

4.2 Soil Borings

4.2.1 Lithology and Bedrock Structure

Soils encountered in the three soil borings west of the Dairy Garage Building included coarse, well rounded gravel with some cobbles. A distinct cobbly layer was encountered at approximately 13 feet bgs in all three soil borings. The observed bedrock surface appears to rise steeper than shown on Figure 4 in the area of soil boring SB-1. However, depth to bedrock determinations from the recent in the soil borings generally concur with the bedrock subsurface topography and the trend of the bedrock trough, as shown in the Anania Geologic Engineering report.

4.2.2 Groundwater Occurrence

Groundwater was encountered in soil borings SB-2 and SB-3 just above the bedrock interface, while in soil boring SB-1 only a thin, (approximately 6-inch) zone of moist soil was detected. The saturated conditions at SB-2 and SB-3 appear to represent a localized occurrence of perched groundwater.

Prior to purging and sampling, groundwater depth measurements were made at SB-2 and SB-3 relative to approximate surface grade. Relative ground surface elevations were established for each soil boring with a level and survey rod. These depth to groundwater measurements and relative ground surface elevations were then used to compute the relative groundwater elevations between respective boreholes. Table 1 shows the soil borings, relative elevations, depth to groundwater measurements, and relative elevations of the groundwater surface. Soil boring SB-3 was assigned a relative ground surface elevation of 100.00 feet, to be used as a baseline for comparison of the ground surface and groundwater elevations.

TABLE 1
Relative Water Level Elevations

Soil Boring	Relative Ground Surface Elevation (ft)	Depth to Groundwater (ft)	Relative Groundwater Elevation
SB-1	99.79	N/A	N/A
SB-2	99.21	27.29	71.92
SB-3	100.00	27.93	72.07

The recent groundwater observations and measurements indicate that perched groundwater is present within portions of a narrow, bedrock trough. A storm water swale and dry well are located just south of the Dairy Garage parking area, outside the footprint of the Howard Street Property (see Figure 4). Surface water infiltration from the swale/dry well area is thought to be a potentially significant recharge component for the perched groundwater unit that is present within the bedrock trough. Additionally, the parking area is within a localized topographic low that also would allow surface water to pond and infiltrate to the subsurface. The lateral extent of the perched unit appears be constrained by the topography of the bedrock trough and likely does not extend to the northeast beneath the Dairy Garage building.

4.2.3 Chemistry

The two groundwater samples collected from soil borings SB-2 and SB-3 were submitted for chemical analysis of VOCs, SVOCs, TPH as gasoline and diesel, and lead. The analytical results were non-detect for the constituents tested except for TPH as diesel.

A petroleum hydrocarbon was detected in the sample from SB-2 at a concentrations of 15 mg/kg. The TPH methodology differentiates seven hydrocarbon fractions based on chromatographic analysis. The sample from SB-2 was not identified as either mineral spirits, jet fuel, kerosene, heavy fuel oil, lube oil, or non-petroleum hydrocarbon (PHC), but as PHC as diesel. Upon request for further clarification of this result, the laboratory indicated that the hydrocarbon detection represented highly weathered (aged) diesel fuel.

5.0 Conclusions and Discussion

The recent field investigation activities were focused on two primary areas of interest: the parking area west of the Dairy Garage building (former UST location) ; and the southern boundary of the former Railroad Yard adjacent to the former Van Waters chemical storage facility (current City of Spokane Park Maintenance Yard). The assessment was conducted to better characterize subsurface conditions for "areas of potential concern" as previously identified by the Phase I and II ESA's. Specifically, efforts were directed at determining the presence or absence of shallow perched groundwater near the Dairy Garage building, and of 100.00 feet, to be used as a baseline for comparison of the ground surface and groundwater elevations.

TABLE 1
Relative Water Level Elevations

Soil Boring	Relative Ground Surface Elevation (ft)	Depth to Groundwater (ft)	Relative Groundwater Elevation
SB-1	99.79	N/A	N/A
SB-2	99.21	27.29	71.92
SB-3	100.00	27.93	72.07

The recent groundwater observations and measurements indicate that perched groundwater is present within portions of a narrow, bedrock trough. A storm water swale and dry well are located just south of the Dairy Garage parking area, outside the footprint of the Howard Street Property (see Figure 4). Surface water infiltration from the swale/dry well area is thought to be a potentially significant recharge component for the perched groundwater unit that is present within the bedrock trough. Additionally, the parking area is within a localized topographic low that also would allow surface water to pond and infiltrate to the subsurface. The lateral extent of the perched unit appears be constrained by the topography of the bedrock trough and likely does not extend to the northeast beneath the Dairy Garage building.

4.2.3 Chemistry

The two groundwater samples collected from soil borings SB-2 and SB-3 were submitted for chemical analysis of VOCs, SVOCs, TPH as gasoline and diesel, and lead. The analytical results were non-detect for the constituents tested except for TPH as diesel.

A petroleum hydrocarbon was detected in the sample from SB-2 at a concentrations of 15 mg/kg. The TPH methodology differentiates seven hydrocarbon fractions based on chromatographic analysis. The sample from SB-2 was not identified as either mineral spirits, jet fuel, kerosene, heavy fuel oil, lube oil, or non-petroleum hydrocarbon (PHC), but as PHC as diesel. Upon request for further clarification of this result, the laboratory indicated that the hydrocarbon detection represented highly weathered (aged) diesel fuel.

5.0 Conclusions and Discussion

The recent field investigation activities were focused on two primary areas of interest: the parking area west of the Dairy Garage building (former UST location) ; and the southern boundary of the former Railroad Yard adjacent to the former Van Waters chemical storage facility (current City of Spokane Park Maintenance Yard). The assessment was conducted to better characterize subsurface conditions for "areas of potential concern" as previously identified by the Phase I and II ESA's. Specifically, efforts were directed at determining the presence or absence of shallow perched groundwater near the Dairy Garage building, and evidence of petroleum-related constituents. In the former Railroad Yard area the investigation objective was to observe subsurface conditions, and analyze the soils for the presence of chemical constituents related to past operating practices.

In the former Railroad Yard area, an approximate 2-foot thick fill zone was found to overlie 2 to 8 feet of sandy to gravelly alluvial soils that were underlain by basalt bedrock. No VOCs or cadmium were detected in the test pit soil samples. Lead was detected at concentrations of 28 mg/kg and 70 mg/kg in two of the test pits. These concentrations exceed the background lead value (15 mg/kg) for the Spokane Basin area (Ecology, 1994), but are below the MTCA Method A (residential) cleanup level of 250 mg/kg. The analysis identified no chemical compounds that would be indicative of residual contaminants from a past release.

In the Dairy Garage parking area, shallow perched groundwater was observed at depths of approximately 27 feet bgs in two of three soil borings drilled to the base of the alluvial sediment sequence. The shallow perched groundwater was found within a buried bedrock channel previously identified during an earlier UST related investigation. The perched groundwater likely is recharged (in part) by an adjacent swale and dry well that receive local stormwater runoff. Two water samples were collected from temporary wells installed in the borings. The sample from the well nearest to the former UST location showed the presence of dissolved phase petroleum hydrocarbons (weathered diesel). The sample from the other boring, located further from the UST area but closer to the swale/dry well was non-detect for the same suite of chemical constituents. The analytical results suggest that petroleum hydrocarbons are present within a limited area of the perched groundwater zone, and likely are derived form residual petroleum hydrocarbons in the soils where the previous independent cleanup occurred.

Data from the Phase II ESA were used to develop a site conceptual model of the shallow subsurface. Overall, site soil conditions encountered during the recent investigation were consistent with observations made during the Phase II ESA. This recent study also addressed a localized occurrence of shallow groundwater where chemicals of interest from past operations were potentially present.

While groundwater was encountered and PHC as diesel was detected in this shallow groundwater, this detection is considered to be of minimal threat to human health and the environment. The following observations and considerations listed below were used in making this determination:

- The shallow, perched, groundwater zone is approximately two to three feet thick, is limited in areal extent to a narrow bedrock trough, and does not appear to extend beneath the nearby Dairy Garage building.
- Surface water infiltration from a nearby stormwater swale and dry well located adjacent to and south of the Dairy Garage parking area may serve as a potentially significant recharge component for the perched groundwater zone. Though located outside the current footprint of the Howard Street Property, this surface water management feature is thought to enhance localized recharge and cause saturation of the granular soils near the bedrock/soil interface within the bedrock trough.

- The groundwater elevations indicate that at the time of measurement a slight head difference was present between SB-3 and SB-2 (see Table 1 and Figure 4). The slightly higher groundwater elevation at SB-3 supports the concept that surface water infiltration in the swale is producing a slight groundwater mound. The lateral movement of perched groundwater in the trough likely would be influenced by stormwater recharge events and the configuration of the bedrock trough feature.

- The absence of saturated conditions in soil boring SB-1 indicates the limited lateral occurrence of perched groundwater. Where present at SB-2 and SB-3, the shallow, perched groundwater system appears laterally restricted to a narrow bedrock trough. Hydraulic communication with beneficial aquifers or surface water is not evident.

- Groundwater samples obtained during this investigation were collected from soil borings, not groundwater monitoring wells; as a result, the samples contained some suspended solids. The only chemical constituent detected was PHC as diesel in SB-2. No BTEX or other VOCs were detected. It is possible that some PHC in the SB-2 groundwater sample was derived from desorption off the solid phase material.

- While the grab water sample resulted in the detection of PHC as diesel, the chromatograph indicated it was highly weathered consistent with indications of an older release.

- The water sample from boring SB-3 was collected approximately 40 feet away from boring SB-2 and showed non-detections for all parameters analyzed including PHC as diesel. This finding suggests that the petroleum hydrocarbon source has a limited areal extent, and likely is derived from residual PHC in the soils from where the previous independent cleanup occurred.

- The bedrock surface is located approximately 26 to 31 feet below ground surface with groundwater occurring at approximately 29 feet below ground surface. The only potentially viable pathway for human contact with shallow groundwater is through incidental ingestion. This pathway is precluded due to the absence of perched zone water supply wells or other potential exposure routes.

- Proposed development of the property includes backfilling the existing stormwater swale and abandoning the dry well, routing surface water away from the Dairy Garage area, placing a restrictive covenant on the property to document the potential presence of regulated chemical constituents in the subsurface, and placing limitations on future land use and excavation to further reduce potential human exposure.

6.0 Recommendations

The Howard Street Property is being considered for acquisition and future development by the City of Spokane Department of Parks and Recreation. The development of the subject property may be implemented in several phases. The proposed public parkland development will modify the existing private commercial/light industrial utilization of the property.

Remedial Action recommendations have been developed in consideration of the results of the subsurface investigation, previously conducted Phase I and II ESAs, and ongoing discussions with Ecology. These proposed remedial actions address the areas of concern identified herein, and could be implemented during future site development.

6.1 Remedial Action Areas

The proposed remedial action areas within the Howard Street Property are summarized in Table 2. Remedial measures include of engineering and institutional controls that would be implemented as part of, and in conjunction with, the proposed property development.

TABLE 2
Remedial Measures—Howard Street Property

Area	Location	Suspected Conditions	Anticipated Extent/Magnitude of Impact	Proposed Remedial Action
Dispenser Area	East of Dairy Garage	Diesel fuel in shallow soils	Approximately 400 cubic yards	Excavation and Disposal
Dairy Garage	Beneath Dairy Garage Building	TPH/metals in soils beneath floor/sumps	Localized beneath basement slab	Building to remain in-place; serves as an effective cover, minimizing potential for leaching. Seal floor sumps and bring into compliance with waste management practices.
Dairy Garage Parking Area	West of Dairy Garage	PHC in shallow, perched groundwater	Areal extent of perched groundwater zone limited to a localized bedrock trough	Aged PHC: source likely from an earlier UST release. Little potential for human/ecology exposure. Natural attenuation processes ongoing. Placement of a soil barrier to prevent future contact and direct exposure. Divert surface water and limit infiltration. Implement institutional controls including restrictive convenants.
Former Railroad Yard Area	South end of Howard Street Property; currently used for parking	PHC and lead in shallow soil locally exceeds MTCA cleanup levels	Former Railroad Yard	Placement of a soil barrier to prevent future contact and direct exposure. Divert surface water and limit infiltration. Implement institutional controls including restrictive convenants.

6.2 Engineering Controls

The proposed development of the project area property would include both landscaped green space areas and impervious surfaces/features such as roads, parking, and buildings. Extensive development-relative excavation is not presently anticipated in the Dairy Parking Garage parking area or former Railroad Yard area.

The diesel-impacted soils near the fuel dispensing area along the southwest corner of the Dairy Garage building are relatively shallow and readily accessible. The recommended remedial response involves excavation of the impacted soil, followed by confirmation sampling to document that cleanup goals had been achieved in this area of concern.

15

Excavated soils would be characterized and disposed offsite at an approved recycling/disposal facility. Once the excavation activities are completed, clean fill material would be placed and compacted in the excavation to re-establish native grade.

It is recommended that the existing basement sumps and other potential pathways or conduits (i.e. cracks) for fluid migration be eliminated to prevent potential migration of hazardous substances into the underlying soils beneath the slab.

The former Dairy Garage area is currently located in a shallow topographic depression bordered by Dean and Cataldo Avenues. A large swale and drywell are located adjacent to, but outside of the project area. This stormwater management feature likely concentrates stormwater runoff from the adjacent property, and may serve as a potentially significant recharge component for the perched groundwater in the buried bedrock trough. Should future property development plans include acquisition of this adjoining parcel, an alternate stormwater management system likely would be installed. One option would be to cover this area with asphalt pavement as part of an access road and parking lot. Surface water runoff could then be controlled and directed away from the existing area of concern. The revised stormwater control features would be designed and constructed to minimize infiltration into the buried bedrock trough to discourage mobilization of TPH-related constituents. Reducing recharge to this area also may affect the presence and/or area extent of the perched groundwater zone. 14

In the former Railroad Yard area, planned development would require placement of at least 24 inches of clean, imported fill, acting as a soil barrier above the existing surface soils. Development plans for this area include new building structures, asphalt surfacing, and green space landscaping. Surface water conveyance structures would be installed to direct stormwater away from areas of concern that would reduce the potential for leaching and mobilization of lead from the soils. The soil barrier (in conjunction with structures, asphalt pavement, and green space landscaping) would provide an adequate separation that would minimize the potential for incidental exposure by persons utilizing the park facilities. 14

6.3 Institutional Controls

Institutional controls proposed for the areas of concern include placement of restrictive covenants on the properties and management of park grounds by City of Spokane maintenance staff. Restrictive covenants would be placed on the property to document the presence of hazardous substances, and to restrict future development and excavation activities. Additionally, these limitations and controls would be incorporated into the future site operations plan. This plan would (1) inform site operators of designated areas of concern, (2) place limitations on use and activities in these areas, and (3) identify proper maintenance protocols that do not conflict with the restrictive covenants.

7.0 References

Leppo Consultants, Inc., November 1998, Phase I Environmental Site Assessment Mallon Street Property (North Bank Master Plan).

CH2M HILL, April 1999, Phase II Environmental Site Assessment Limited Subsurface Exploration "Howard Street Property."

Washington State D.N.R., 1991, Geologic Map of Washington, Northeastern Quadrant 1:250,000, Geologic Map GM 39.

Anania Geologic Engineering, 1990, Carnation/Spokane 411 West Cataldo Avenue, Spokane, WA, various figures.

Dunn, Carney, Allen, Higgins & Tongue, June 22, 1990, Letter correspondence with the Washington State Department of Ecology.

USDA Soil Conservation Service, 1968, Soil Survey of Spokane County.

U.S.G.S. Topographic Map, 1986, Spokane NW 7.5 Minute Quadrangle.

San Juan, Charles, October 1994, Natural Background Soils Metals Concentrations in Washington State, Washington State Department of Ecology Publication No. 94-115

8.0 Special Terms and Conditions

This investigation is part of a business decision tool prepared exclusively for the City of Spokane. The investigation was limited to soils and shallow perched groundwater in the areas identified in Section 1.1 and did not extend into the underlying basalt bedrock.

No warranty, express or implied, is made. There are no beneficiaries of the work products other than The City, and no other person or entity is entitled to rely upon the work products without the written consent of CH2M HILL.

Identification of parties potentially responsible for the cleanup of hazardous substance releases was not attempted.

The CH2M HILL personnel who performed the subsurface investigation are not attorneys. Therefore this report is not a legal representation or interpretation of environmental laws, rules, regulations, or policies of local, state, or federal governmental agencies.

The information presented herein applies to site conditions existing when services were performed. CH2M HILL cannot report on, or accurately predict events that may change the site conditions after the described services were performed, whether occurring naturally or caused by external forces.

CH2M HILL's scope of services did not include directly or indirectly storing, arranging for or actually transporting, disposing, treating or monitoring hazardous substances, hazardous materials, hazardous wastes or hazardous oils. Investigation derived wastes were stockpiled onsite and, pending results of soil and groundwater sampling, will need to be disposed of in an appropriate manager.

Appendix A

Test Pit Logs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	TP-1 (8/24/99)
149259.4L.FI		SHEET 1 OF 1

TEST PIT LOG

PROJECT : Howard St Property R.I LOCATION : Railroad Area South LOGGER : R. Martin

ELEVATION : CONTRACTOR Budinger & Associates

EXCAVATION EQUIPMENT USED Backhoe 580 Super K Case DATE EXCAVATED: 8/24/99

WATER LEVEL : N/A APPROX. DIMENS: Length: Width: Max. Depth:

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	NUMBER AND TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS.
2.0			2.0 GP- darker, more compact, sandy gravel, dry, no odor, dk. brown	
5	TP1-5'	Grab	5.0 Sandy gravel, GP, poorly sorted, dry, loose, no odor, lt. brown	
7			7.0 Sandy gravel, GP, loose, more sand, dry, no odor	
10	TP1-10'	Grab	TD	
15				
20				
25				
30				
35				

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER
149259.4L.FI	TP-2 (8/24/99) SHEET 1 OF 1

TEST PIT LOG

PROJECT : Howard St Property R.I
LOCATION : Railroad Area South
LOGGER : R. Martin
ELEVATION :
CONTRACTOR Budinger & Associates
EXCAVATION EQUIPMENT USED Backhoe 580 Super K Case
WATER LEVEL : N/A
APPROX. DIMENS: Length: 8' Width: 3' Max. Depth: 7'
DATE EXCAVATED: 8/24/99

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	NUMBER AND TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS.
			GP - Loose, dk brown, sandy gravel, some brick (red), dry, no odor	
2.0			2.0 GP	
5				
7		TP-2 - 7'	7.0 TD	
10				
15				
20				
25				
30				
35				

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	TP-3 (8/24/99)
149259.4L.FI		SHEET 1 OF 1

TEST PIT LOG

PROJECT : Howard St Property R.I LOCATION : Railroad Area South LOGGER : R. Martin

ELEVATION : CONTRACTOR Budinger & Associates

EXCAVATION EQUIPMENT USED Backhoe 580 Super K Case DATE EXCAVATED: 8/24/99

WATER LEVEL : N/A APPROX. DIMENS: Length: 6' Width: 3' Max. Depth: 4'

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	NUMBER AND TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS.
			GP - basalt cobbles w/ dk brown sand, some bricks, dry, no odor loose	Hard excavation through RIP-RAP
4		TP3 - 4'	4.0 refusal, basalt	
5				
10				
15				
20				
25				
30				
35				

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER SB - 1
149259.4L.FI	SHEET 1 OF 1

Soil Boring Log

PROJECT : Howard St Property R.I   LOCATION : 508 Cataldo   LOGGER : R. Martin
ELEVATION : 2640 ft   CONTRACTOR Budinger & Associates
EXCAVATION EQUIPMENT USED Hallow stem auger - mobile B-57   DATE EXCAVATED: 8/99

DEPTH BELOW SURFACE (FT)	TIME	NUMBER AND TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS.
	9:04			
2.5	9:06		Well rounded coarse gravel with sand brown, dry, no odor	
	9:06			
5				
7.5	9:07		Well rounded coarse gravel with sand brown, dry, no odor	
	9:08			
12.5	9:09		Well rounded coarse gravel with sand brown, dry, no odor	13 to 15, harder drilling, possible cobbles
	9:10			
15				
17.5	9:12		Well rounded coarse gravel with sand brown, dry, no odor	
	9:13			
20				
22.5	9:15			
	9:17			
27.5	9:49		Last flight of auger moist soil on retrival	
29	9:27			Refusal @ 29' with solid augers
30				
35				

CH2MHILL

PROJECT NUMBER 149259.4L.FI	TEST PIT NUMBER SB -2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Howard St Property R.I   LOCATION : 508 Cataldo   LOGGER : R. Martin

ELEVATION : 2640 ft   CONTRACTOR Budinger & Associates

EXCAVATION EQUIPMENT USED Hallow stem auger - mobile B-57   DATE EXCAVATED: 8/99

DEPTH BELOW SURFACE (FT)	TIME	NUMBER AND TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS.
0	12:18			
2.5	12:19 12:19		Well rounded coarse gravel with sand brown, dry, no odor	
5				
7.5	12:21 12:23		Well rounded coarse gravel with sand brown, dry, no odor	
10				
12.5	12:27 12:29		Well rounded coarse gravel with sand brown, dry, no odor	
15				13 to 15, harder drilling, possible cobbles
17.5	12:34 12:36		Well rounded coarse gravel with sand brown, dry, no odor	
20				
22.5	12:38		Well rounded coarse gravel with sand brown, dry, no odor	
25				TD with augar @ 31' - refusal in assumed basalt Drive sample - wet approx 1.5' Moist 30 - 31' Installing temp. screen (5') 0.010" screen with 25' blank - PVC sch. 40
27.5	12:41 12:42		Well rounded coarse gravel with sand brown, dry, no odor	
30	12:44		Well rounded coarse gravel with sand brown, dry, no odor	DTW 27.29' TD 30.21'
32.5				

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER SB-3
149259.4L.FI	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Howard St Property R.I LOCATION : Farm Dairy Garage LOGGER : R. Martin
ELEVATION : CONTRACTOR Budinger & Associates
EXCAVATION EQUIPMENT USED Hallow stem auger - mobile B-57 DATE EXCAVATED: 08/24/99

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	NUMBER AND TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS.
5			Well rounded coarse gravel with sand brown, dry, no odor	
10			Well rounded coarse gravel with sand brown, dry, no odor	
				13 to 15, harder drilling, possible cobbles
15			Well rounded coarse gravel with sand brown, dry, no odor	
20			Well rounded coarse gravel with sand brown, dry, no odor	
25			Well rounded coarse gravel with sand brown, dry, no odor	
30			Well rounded coarse gravel with sand brown, dry, no odor TD 30'	27.93 DTW Ground 29.95 TD Surface
35				

Appendix B

Chain of Custody, Analytical Reports, and Quality Control Report

Columbia Analytical Services INC.
An Employee-Owned Company

September 7, 1999

Service Request No: K9905775

Bob Martin
CH2M Hill Corporation
9 South Washington, Suite 400
Spokane, WA 99201

Re: Howard St. Remedial Inv./149259.4L.AT

Dear Bob:

Enclosed are the results of the rush sample(s) submitted to our laboratory on August 26, 1999. For your reference, these analyses have been assigned our service request number K9905775.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda A. Huckestein
Client Services Manager

LAH/ll

17 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/ 577-7222 • Fax 360/636-1068

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill Corporation	**Service Request No.:**	K9905775
Project:	Howard St. Remedial INv.	**Date Received:**	8/26/99
Sample Matrix:	Soil, Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

Due to the expedited turn around time requirements for these analyses and with Bob Martin's permission, the analyses for volatiles by EPA Method 8260, were performed at our laboratory in Jacksonville Florida.

Sample SB-2 was received preserved for metals analysis prior to filtering for dissolved metals. A portion of the unpreserved sample container was subaliquoted, filtered and preserved for the dissolved metals analysis.

The Terphenyl-d14 surrogate recovery for Semivolatiles in sample SB-2 was outside normal CAS control limits because of suspected matrix interference. The chromatogram showed components that prevented accurate quantitation of the surrogate. The sample is in the process of reextraction. If results of the reanalysis differ significantly from the original analysis, they will be sent under separate cover.

Approved by ________ **Date** 9/6/99

Columbia Analytical Services inc

An Employee-Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K9905975

PAGE 1 OF 1 COC #

00042

PROJECT NAME: Howard St. Remedial Inv.

PROJECT NUMBER: 149259.4L.AT

PROJECT MANAGER: Bob Martin

COMPANY/ADDRESS: CH2M HILL

PHONE # 509 747-2000 FAX # 623-

SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☒	Volatile Organics 624☐ 8260☒ 8021☐ BTEX☐	Pesticide / Herbicides 608☐ 8081☐ 8141☐ 8151☐	Total Toxic Organics (TTO) 608☐ 624☐ 625☐	PCB AROCLORS 8082	NWTPH - HCID☐ NWTPH-DX☒ NWTPH-GX☒	Hydrocarbon Scan☐ O & G☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHs 8310☐	GCMS-SIM PAH☐ Phenol☐ SIM☐ Phthalates☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle)	TOC 9020☐ AOX 1650☐ 506☐				REMARKS
SB-2	8/23/99	15:05	1	H2O	8	X	X				X					X								FILTER Pb
TP1-5'	8/24/99	8:50	2	Soil	2		X									X								+Cd
TP1-10'	8/24/99	9:20	3	"	2		X									X								+Cd
TP2-7'	8/24/99	10:45	4	"	2		X									X								+Cd
TP3-4'	8/24/99	10:30	5	"	2		X									X								+Cd
SB-3	8/24/99	5:15pm	6	H2O	8	X	X				X					X								FILTER Pb
																								Rec'd 4 TRIPS NOT LISTED

REPORT REQUIREMENTS

- I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- III. Data Validation Report (includes all raw data)
- IV. CLP Deliverable Report
- V. EDD

INVOICE INFORMATION

P.O. #

Bill To:

TURNAROUND REQUIREMENTS

- ___ 24 hr. ___ 48 hr.
- X 5 Day
- ___ Standard (10-15 working days)
- ___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Soil only — FILTER IN LAB

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

SPECIAL INSTRUCTIONS/COMMENTS:

FILTER WATER PRIOR TO Pb ANALYSIS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 8/25/99 8:59	Signature: [signature] Date/Time: 8/26/99 0920	Signature Date/Time	Signature Date/Time
Printed Name: ROBERT MARTIN Firm: CH2M	Jon K. Ham CAS		

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Soil

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
TP1-5'	K9905775-002	8/26/99	97.4	
TP1-10'	K9905775-003	8/26/99	96.0	
TP2-7'	K9905775-004	8/26/99	96.1	
TP3-4'	K9905775-005	8/26/99	92.4	

Approved By: [signature]
TSOLIDS.XLT_Sample/810719984
05775TS.ABT - 005 8/27/99

Date: 8/24/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation		
Project:	Howard St. Remedial Inv./149259.4L.AT	**Service Request:**	K9905775
Sample Matrix:	Soil	**Date Collected:**	8/24/99
		Date Received:	8/26/99
		Date Extracted:	8/30/99

Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Cadmium**	**Lead**
	EPA Method:	6010B	6010B
	Method Reporting Limit:	1	20
	Date Analyzed:	9/1/99	9/1/99
Sample Name	**Lab Code**		
TP1-5'	K9905775-002	ND	ND
TP1-10'	K9905775-003	ND	ND
TP2-7'	K9905775-004	ND	28
TP3-4'	K9905775-005	ND	70
Method Blank	K9905775-MB	ND	ND

Approved By: [signature] Date: 9/2/99

3AEPA/102494
85775ICP.BR1 - Sample 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation
Project:	Howard St. Remedial Inv./149259.4L.AT
Sample Matrix:	Water

Service Request:	K9905775
Date Collected:	8/23, 24/99
Date Received:	8/26/99
Date Extracted:	8/30/99
Date Analyzed:	8/31/99

Dissolved Lead
EPA Method 7421
Units: ug/L (ppb)

Sample Name	Lab Code	MRL	Result
SB-2	K9905775-001	2	ND
SB-3	K9905775-006	2	ND
Method Blank	K9905775-MB	2	ND

Approved By: JC Date: 9/2/99

1AMRL/071398
[illegible].DB1 - Sample (2) 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation		
Project:	Howard St. Remedial Inv./149259.4L.AT	**Service Request:**	K9905775
Sample Matrix:	Water	**Date Collected:**	8/23/99
		Date Received:	8/26/99

Semivolatile Petroleum Products
Northwest TPH-Dx

Sample Name:	SB-2		
Lab Code:	K9905775-001	Units:	ug/L (ppb)
Test Notes:		Basis:	NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Mineral Spirits	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Jet Fuel as Jet A	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Kerosene	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Diesel	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Heavy Fuel Oil	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	
Lube Oil	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	
PHC as Diesel	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	15000	
Non-PHC as Diesel	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	

PHC as Diesel Fuel: Extractable Petroleum Hydrocarbon fingerprint not matching any of the target analytes.
Non-PHC as Diesel: Non-Petroleum Hydrocarbon components eluting in the extractable range of n-C8 - n-C44.

Approved By: MMantha Date: 9/2/99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99

Semivolatile Petroleum Products
Northwest TPH-Dx

Sample Name: SB-3
Lab Code: K9905775-006
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Mineral Spirits	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Jet Fuel as Jet A	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Kerosene	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Diesel	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/31/99	ND	
Heavy Fuel Oil	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	
Lube Oil	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	
PHC as Diesel	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	
Non-PHC as Diesel	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/31/99	ND	
				1	8/28/99	8/31/99	ND	

PHC as Diesel Fuel: Extractable Petroleum Hydrocarbon fingerprint not matching any of the target analytes.
Non-PHC as Diesel: Non-Petroleum Hydrocarbon components eluting in the extractable range of n-C8 - n-C44.

Approved By: MMandhe Date: 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA

Semivolatile Petroleum Products
Northwest TPH-Dx

Sample Name: Method Blank
Lab Code: K990828-WB
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Mineral Spirits	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/30/99	ND	
Jet Fuel as Jet A	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/30/99	ND	
Kerosene	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/30/99	ND	
Diesel	EPA 3510C	NWTPH-Dx	250	1	8/28/99	8/30/99	ND	
Heavy Fuel Oil	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/30/99	ND	
Lube Oil	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/30/99	ND	
PHC as Diesel	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/30/99	ND	
Non-PHC as Diesel	EPA 3510C	NWTPH-Dx	500	1	8/28/99	8/30/99	ND	

PHC as Diesel Fuel: Extractable Petroleum Hydrocarbon fingerprint not matching any of the target analytes.
Non-PHC as Diesel: Non-Petroleum Hydrocarbon components eluting in the extractable range of n-C8 - n-C44.

Approved By: MMauthe Date: 9/2/99

1S22/020397p

00775PHC.MB3 - MBlank 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	Service Request:	K9905775
Project:	Howard St. Remedial Inv./149259.4L.AT	Date Collected:	8/23/99
Sample Matrix:	Water	Date Received:	8/26/99

Volatile Petroleum Products
Northwest TPH-Gx

Sample Name:	SB-2	Units:	ug/L (ppb)
Lab Code:	K9905775-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	
PHC as Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	
Non-PHC as Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	

PHC as Gasoline: Volatile or Middle Distillate Petroleum Hydrocarbon fingerprint not matching any of the target analytes.
Non-PHC as Gasoline: Non-Petroleum Hydrocarbon components eluting in the purgable range of n-C6 - naphthalene.

Approved By: VW Date: 9-3-99

1S22/020597p

05775VOA.ML1 - 1 9/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99

Volatile Petroleum Products
Northwest TPH-Gx

Sample Name: SB-3
Lab Code: K9905775-006
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	
PHC as Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	
Non-PHC as Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	

PHC as Gasoline: Volatile or Middle Distillate Petroleum Hydrocarbon fingerprint not matching any of the target analytes.
Non-PHC as Gasoline: Non-Petroleum Hydrocarbon components eluting in the purgable range of n-C6 - naphthalene.

Approved By: VJ Date: 9-3-99

1S22/020597p

02775VOA.ML1 - 2/9/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA

Volatile Petroleum Products
Northwest TPH-Gx

Sample Name: Method Blank
Lab Code: K990903-MB
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	
PHC as Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	
Non-PHC as Gasoline	EPA 5030B	NWTPH-Gx	250	1	NA	9/3/99	ND	

PHC as Gasoline: Volatile or Middle Distillate Petroleum Hydrocarbon fingerprint not matching any of the target analytes.
Non-PHC as Gasoline: Non-Petroleum Hydrocarbon components eluting in the purgable range of n-C6 - naphthalene.

Approved By: VW Date: 9-3-99

1S22/020397p

05725VOA.ML1 - MBlank 9/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4LAT
Sample Matrix: Water

Service Request: J9902556
Date Collected: 8/23-24/99
Date Received: 8/26/99
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8260
Units: µg/L (ppb)

Analyte	MRL	SB-2	SB-3	Method Blank
Sample Name:		SB-2	SB-3	Method Blank
Lab Code:		J9902556-01	J9902556-06	J990902-MB
Date Analyzed:		9/2/99	9/2/99	9/2/99
Acetone	50	ND	ND	ND
Acrolein	10	ND	ND	ND
Acrylonitrile	8	ND	ND	ND
Benzene	1	ND	ND	ND
Bromodichloromethane	1	ND	ND	ND
Bromoform	1	ND	ND	ND
Bromomethane	1	ND	ND	ND
2-Butanone (MEK)	10	ND	ND	ND
Carbon Disulfide	1	ND	ND	ND
Carbon Tetrachloride	1	ND	ND	ND
Chlorobenzene	1	ND	ND	ND
Chloroethane	1	ND	ND	ND
Chloroform	1	ND	ND	ND
Chloromethane	1	ND	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND	ND
Dibromochloromethane	1	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	10	ND	ND	ND
1,2-Dibromoethane (EDB)	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
trans-1,4-Dichloro-2-butene	10	ND	ND	ND
1,1-Dichloroethane	1	ND	ND	ND
1,2-Dichloroethane	1	ND	ND	ND
1,1-Dichloroethene	1	ND	ND	ND
cis-1,2-Dichloroethene	1	ND	ND	ND
trans-1,2-Dichloroethene	1	ND	ND	ND
Dichlorodifluoromethane	1	ND	ND	ND
Ethylbenzene	1	ND	ND	ND
Ethyl Methacrylate	5	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Iodomethane	10	ND	ND	ND
Methylene Chloride	5	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND	ND
Styrene	1	ND	ND	ND
1,1,1,2-Tetrachloroethane	1	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND
Toluene	1	ND	ND	ND
1,1,1-Trichloroethane (TCA)	1	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND
Trichlorofluoromethane (CFC 11)	1	ND	ND	ND
1,2,3-Trichloropropane	1	ND	ND	ND
Vinyl Acetate	10	ND	ND	ND
Vinyl Chloride	1	ND	ND	ND
Total Xylenes	2	ND	ND	ND

Approved By: LAH Date: 9/8/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
Sample Matrix: Soil

Service Request: J9902556
Date Collected: 8/24/99
Date Received: 8/26/99
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8260
Units: µg/Kg (ppb)
Dry Weight Basis

Analyte	MRL	Sample Name: / Lab Code: / Date Analyzed:	TP1-5' J9902556-02 9/1/99	TP1-10' J9902556-03 9/1/99	TP2-7' J9902556-04 9/1/99
Acetone	50		ND	ND	ND
Acrolein	10		ND	ND	ND
Acrylonitrile	10		ND	ND	ND
Benzene	1		ND	ND	ND
Bromodichloromethane	1		ND	ND	ND
Bromoform	1		ND	ND	ND
Bromomethane	1		ND	ND	ND
2-Butanone (MEK)	10		ND	ND	ND
Carbon Disulfide	1		ND	ND	ND
Carbon Tetrachloride	1		ND	ND	ND
Chlorobenzene	1		ND	ND	ND
Chloroethane	1		ND	ND	ND
Chloroform	1		ND	ND	ND
Chloromethane	1		ND	ND	ND
2-Chloroethyl Vinyl Ether	10		ND	ND	ND
Dibromochloromethane	1		ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	10		ND	ND	ND
1,2-Dibromoethane (EDB)	1		ND	ND	ND
1,2-Dichlorobenzene	1		ND	ND	ND
1,3-Dichlorobenzene	1		ND	ND	ND
1,4-Dichlorobenzene	1		ND	ND	ND
trans-1,4-Dichloro-2-butene	10		ND	ND	ND
1,1-Dichloroethane	1		ND	ND	ND
1,2-Dichloroethane	1		ND	ND	ND
1,1-Dichloroethene	1		ND	ND	ND
cis-1,2-Dichloroethene	1		ND	ND	ND
trans-1,2-Dichloroethene	1		ND	ND	ND
Dichlorodifluoromethane	1		ND	ND	ND
Ethylbenzene	1		ND	ND	1
Ethyl Methacrylate	10		ND	ND	ND
2-Hexanone	10		ND	ND	ND
Iodomethane	10		ND	ND	ND
Methylene Chloride	10		ND	ND	ND
4-Methyl-2-pentanone (MIBK)	10		ND	ND	ND
Styrene	1		ND	ND	1
1,1,1,2-Tetrachloroethane	1		ND	ND	ND
1,1,2,2-Tetrachloroethane	1		ND	ND	ND
Tetrachloroethene (PCE)	1		ND	ND	ND
Toluene	1		ND	ND	2
1,1,1-Trichloroethane (TCA)	1		ND	ND	ND
1,1,2-Trichloroethane	1		ND	ND	ND
Trichloroethene (TCE)	1		ND	ND	ND
Trichlorofluoromethane (CFC 11)	1		ND	ND	ND
1,2,3-Trichloropropane	1		ND	ND	ND
Vinyl Acetate	10		ND	ND	ND
Vinyl Chloride	1		ND	ND	ND
Total Xylenes	2		ND	ND	ND

Approved By: ______ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
Sample Matrix: Soil

Service Request: J9902556
Date Collected: 8/24/99
Date Received: 8/26/99
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8260
Units: µg/Kg (ppb)
Dry Weight Basis

Analyte	MRL	Sample Name:	TP3-4'	Method Blank
		Lab Code:	J9902556-05	J990901-MB
		Date Analyzed:	9/1/99	9/1/99
Acetone	50		ND	ND
Acrolein	10		ND	ND
Acrylonitrile	10		ND	ND
Benzene	1		ND	ND
Bromodichloromethane	1		ND	ND
Bromoform	1		ND	ND
Bromomethane	1		ND	ND
2-Butanone (MEK)	10		ND	ND
Carbon Disulfide	1		ND	ND
Carbon Tetrachloride	1		ND	ND
Chlorobenzene	1		ND	ND
Chloroethane	1		ND	ND
Chloroform	1		ND	ND
Chloromethane	1		ND	ND
2-Chloroethyl Vinyl Ether	10		ND	ND
Dibromochloromethane	1		ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	10		ND	ND
1,2-Dibromoethane (EDB)	1		ND	ND
1,2-Dichlorobenzene	1		ND	ND
1,3-Dichlorobenzene	1		ND	ND
1,4-Dichlorobenzene	1		ND	ND
trans-1,4-Dichloro-2-butene	10		ND	ND
1,1-Dichloroethane	1		ND	ND
1,2-Dichloroethane	1		ND	ND
1,1-Dichloroethene	1		ND	ND
cis-1,2-Dichloroethene	1		ND	ND
trans-1,2-Dichloroethene	1		ND	ND
Dichlorodifluoromethane	1		ND	ND
Ethylbenzene	1		1	ND
Ethyl Methacrylate	10		ND	ND
2-Hexanone	10		ND	ND
Iodomethane	10		ND	ND
Methylene Chloride	10		ND	ND
4-Methyl-2-pentanone (MIBK)	10		ND	ND
Styrene	1		ND	ND
1,1,1,2-Tetrachloroethane	1		ND	ND
1,1,2,2-Tetrachloroethane	1		ND	ND
Tetrachloroethene (PCE)	1		ND	ND
Toluene	1		2	ND
1,1,1-Trichloroethane (TCA)	1		ND	ND
1,1,2-Trichloroethane	1		ND	ND
Trichloroethene (TCE)	1		ND	ND
Trichlorofluoromethane (CFC 11)	1		ND	ND
1,2,3-Trichloropropane	1		ND	ND
Vinyl Acetate	10		ND	ND
Vinyl Chloride	1		ND	ND
Total Xylenes	2		ND	ND

Approved By: ______________ Lesk Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259 4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23/99
Date Received: 8/26/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: SB-2
Lab Code: K9905775-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
Aniline	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
Bis(2-chloroethyl) Ether	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Phenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2-Chlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
1,3-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
1,2-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
1,4-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Benzyl Alcohol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2-Methylphenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Hexachloroethane	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
N-Nitrosodi-n-propylamine	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
3- and 4-Methylphenol Coelution	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Nitrobenzene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Isophorone	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2-Nitrophenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2,4-Dimethylphenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Bis(2-chloroethoxy)methane	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2,4-Dichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Benzoic Acid	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
1,2,4-Trichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Naphthalene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
4-Chloroaniline	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Hexachlorobutadiene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
4-Chloro-3-methylphenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2-Methylnaphthalene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Hexachlorocyclopentadiene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2,4,6-Trichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2,4,5-Trichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2-Chloronaphthalene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
Acenaphthylene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Dimethyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
2,6-Dinitrotoluene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Acenaphthene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
3-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
2,4-Dinitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
Dibenzofuran	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
4-Nitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
2,4-Dinitrotoluene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Fluorene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Diethyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	

Approved By: ______ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23/99
Date Received: 8/26/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: SB-2
Lab Code: K9905775-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
N-Nitrosodiphenylamine	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Hexachlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Pentachlorophenol (PCP)	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
Phenanthrene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Anthracene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Di-n-butyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Pyrene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Butyl Benzyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
3,3'-Dichlorobenzidine	EPA 3520C	8270C	25	1	8/27/99	9/2/99	ND	
Benz(a)anthracene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Chrysene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Di-n-octyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Benzo(b)fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Benzo(k)fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Benzo(a)pyrene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Dibenz(a,h)anthracene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	
Benzo(g,h,i)perylene	EPA 3520C	8270C	10	1	8/27/99	9/2/99	ND	

Approved By: _____ CAt Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259 4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: SB-3
Lab Code: K9905775-006
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Aniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Bis(2-chloroethyl) Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Phenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Chlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
1,3-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
1,2-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
1,4-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzyl Alcohol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Methylphenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachloroethane	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
N-Nitrosodi-n-propylamine	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
3- and 4-Methylphenol Coelution	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Nitrobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Isophorone	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Nitrophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4-Dimethylphenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Bis(2-chloroethoxy)methane	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4-Dichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzoic Acid	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
1,2,4-Trichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Naphthalene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Chloroaniline	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachlorobutadiene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Chloro-3-methylphenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Methylnaphthalene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachlorocyclopentadiene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4,6-Trichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4,5-Trichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Chloronaphthalene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Acenaphthylene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Dimethyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,6-Dinitrotoluene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Acenaphthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
3-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
2,4-Dinitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Dibenzofuran	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Nitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
2,4-Dinitrotoluene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Fluorene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Diethyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	

Approved By: ________ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: SB-3
Lab Code: K9905775-006
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
N-Nitrosodiphenylamine	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Pentachlorophenol (PCP)	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Phenanthrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Anthracene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Di-n-butyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Pyrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Butyl Benzyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
3,3'-Dichlorobenzidine	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Benz(a)anthracene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Chrysene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Di-n-octyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(b)fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(k)fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(a)pyrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Dibenz(a,h)anthracene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(g,h,i)perylene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	

Approved By: Vnt Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG9902805-6
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
N-Nitrosodimethylamine	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Aniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Bis(2-chloroethyl) Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Phenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Chlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
1,3-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
1,2-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
1,4-Dichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzyl Alcohol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Bis(2-chloroisopropyl) Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Methylphenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachloroethane	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
N-Nitrosodi-n-propylamine	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
3- and 4-Methylphenol Coelution	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Nitrobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Isophorone	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Nitrophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4-Dimethylphenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Bis(2-chloroethoxy)methane	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4-Dichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzoic Acid	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
1,2,4-Trichlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Naphthalene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Chloroaniline	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachlorobutadiene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Chloro-3-methylphenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Methylnaphthalene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachlorocyclopentadiene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4,6-Trichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,4,5-Trichlorophenol	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Chloronaphthalene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Acenaphthylene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Dimethyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
2,6-Dinitrotoluene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Acenaphthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
3-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
2,4-Dinitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Dibenzofuran	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Nitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
2,4-Dinitrotoluene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Fluorene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Chlorophenyl Phenyl Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Diethyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	

Approved By: ____ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG9902805-6
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
4-Nitroaniline	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
2-Methyl-4,6-dinitrophenol	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
N-Nitrosodiphenylamine	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
4-Bromophenyl Phenyl Ether	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Hexachlorobenzene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Pentachlorophenol (PCP)	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Phenanthrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Anthracene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Di-n-butyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Pyrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Butyl Benzyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
3,3'-Dichlorobenzidine	EPA 3520C	8270C	25	1	8/27/99	9/1/99	ND	
Benz(a)anthracene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Chrysene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Di-n-octyl Phthalate	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(b)fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(k)fluoranthene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(a)pyrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Dibenz(a,h)anthracene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	
Benzo(g,h,i)perylene	EPA 3520C	8270C	10	1	8/27/99	9/1/99	ND	

Approved By: CAH Date: 9/6/99

1S2p/052393

05775SVMLA.Y2 - MB 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Soil

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99

Duplicate Summary

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TP1-5'	K9905775-002DUP	8/26/99	97.4	97.5	97.5	<1	

Approved By: [signature] Date: 9/30/99

TSOLIDS.XLT_DUP/092199a

K9905775.ABI - DUP 9/23/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Soil

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99
Date Extracted: 8/30/99
Date Analyzed: 9/1/99

Duplicate Summary
Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: TP1-5'
Lab Code: K9905775-002DUP

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Cadmium	6010B	1	ND	ND	ND	-
Lead	6010B	20	ND	ND	ND	-

Approved By: ________ Date: 9/2/99

DUP1SEPA/102194

99775ICP.DR1 - DUP 9/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Soil

Service Request: K9905775
Date Collected: 8/24/99
Date Received: 8/26/99
Date Extracted: 8/30/99
Date Analyzed: 9/1/99

Matrix Spike Summary
Total Metals
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: TP1-5'
Lab Code: K9905775-002MS

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Cadmium	1	10	ND	10	100	75-125
Lead	20	100	ND	105	105	75-125

Approved By: _[signature]_ Date: 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
LCS Matrix: Soil

Service Request: K9905775
Date Collected: NA
Date Received: NA
Date Analyzed: 9/1/99

Laboratory Control Sample Summary
Total Metals
Units: mg/Kg (ppm)

Source: ERA Priority Pollutant/CLP Inorganic Soils

Analyte	EPA Method	True Value	Result	Control Limits
Cadmium	6010B	71.1	73.0	39.3-103
Lead	6010B	147	156	88.1-206

Approved By: ____ Date: 9/2/99

LCSEPA/102194
00775ICP.BR1 - LCSS 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23/99
Date Received: 8/26/99
Date Extracted: 8/30/99
Date Analyzed: 8/31/99

Duplicate Summary
Dissolved Metals
Units: ug/L (ppb)

Sample Name: SB-2
Lab Code: K9905775-001DUP

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Lead	7421	2	ND	ND	ND	-

Approved By: JK Date: 9/2/99

[illegible]
[illegible] - DUP [illegible]

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23/99
Date Received: 8/26/99
Date Extracted: 8/30/99
Date Analyzed: 8/31/99

Matrix Spike Summary
Dissolved Metals
Units: ug/L (ppb)

Sample Name: SB-2
Lab Code: K9905775-001MS

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Lead	2	20	ND	19	95	75-125

Approved By: _______ Date: 9/2/99

MS1S/102194
05775ICP.BS1 - Spike (2) 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
LCS Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA
Date Analyzed: 8/30/99

Laboratory Control Sample Summary
Dissolved Metals
Units: ug/L (ppb)

Source: CAS Spike Solution

Analyte	EPA Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Lead	7421	25.0	23.6	94	85-115

Approved By: [signature] Date: 9/2/99

LCSEPA/102194
05775ICP.MI1 - LCSW 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23-24/99
Date Received: 8/26/99
Date Extracted: 8/28/99
Date Analyzed: 8/30-31/99

Surrogate Recovery Summary
Northwest TPH-Dx

Prep Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			o-Terphenyl	n-Triacontane
SB-2	K9905775-001		80	80
SB-3	K9905775-006		75	78
Batch QC	K9905774-001		79	84
Batch QC	K9905774-001DUP		71	74
Lab Control Sample	K990828-WL		68	72
Method Blank	K990828-WB		69	73
CAS Acceptance Limits:			50-150	50-150

Approved By: MManthe Date: 9/2/99

SUR2/041197p
0377SPHC.MB1 - SUR 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
LCS Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA
Date Extracted: 8/28/99
Date Analyzed: 8/30/99

Laboratory Control Sample Summary
Northwest TPH-Dx

Sample Name: Lab Control Sample
Lab Code: K990828-WL
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Diesel	EPA 3510C	NWTPH-Dx	1600	1000	63	46-108	
Lube Oil	EPA 3510C	NWTPH-Dx	1600	1200	75	50-150	

Approved By: MManthe Date: 9/2/99

LCS/090382e/MEI - LCS 9/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23/99
Date Received: 8/26/99
Date Extracted: NA
Date Analyzed: 9/3/99

Surrogate Recovery Summary
Northwest TPH-Gx

Prep Method: EPA 5030B
Analysis Method: NWTPH-Gx

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery 1,4-Difluorobenzene
SB-2	K9905775-001		113
SB-3	K9905775-006		111
Method Blank	K990903-MB		110

CAS Acceptance Limits: 70-130

Approved By: ____ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
Sample Matrix: Soil

Service Request: J9902556
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 9/1/99

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8260

Sample Name	Lab Code	Percent Recovery Dibromofluoromethane	Toluene-d_8	4-Bromofluorobenzene
TP1-5'	J9902556-02	96	98	91
TP1-10'	J9902556-03	96	97	90
TP2-7'	J9902556-04	98	99	91
TP3-4'	J9902556-05	99	100	92
Method Blank	J990901-MB	98	100	93
Laboratory Control Sample	J990901-LCS	101	97	91
Batch QC	J9902556-02MS	98	100	95
Batch QC	J9902556-02MSD	98	98	93
CAS Acceptance Limits:		83-117	81-119	65-135

Approved By: ______ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
Sample Matrix: Soil

Service Request: J9902556
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 9/1/99

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 8260
Units: µg/Kg (ppb)

Sample Name: Batch QC
Lab Code: Batch QC

	Spike Level		Sample	Spike Result		Percent Recovery			
Analyte	**MS**	**DMS**	**Result**	**MS**	**DMS**	**MS**	**DMS**	**EPA Acceptance Limits**	**Relative Percent Difference**
1,1-Dichloroethene	50	50	ND	36	36	72	72	56-126	<1
Benzene	50	50	ND	43	45	86	90	55-130	5
Trichloroethene	50	50	ND	44	46	88	92	47-130	4
Toluene	50	50	ND	43	45	86	90	51-129	5
Chlorobenzene	50	50	ND	43	45	86	90	38-131	5

Approved By: ___ Lost ___ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
LCS Matrix: Soil

Service Request: J9902556
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 9/1/99

Laboratory Control Sample Summary
Volatile Organic Compounds
EPA Method 8260
Units: µg/Kg (ppb)

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Limits
1,1-Dichloroethene	50	38	76	56-126
Benzene	50	47	94	55-130
Trichloroethene	50	45	90	47-130
Toluene	50	44	88	51-129
Chlorobenzene	50	45	90	38-131

Approved By: ________________ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
Sample Matrix: Water

Service Request: J9902556
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 9/2/99

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8260

Sample Name	Lab Code	Percent Recovery Dibromofluoromethane	Percent Recovery Toluene-d_8	Percent Recovery 4-Bromofluorobenzene
SB-2	J9902556-01	96	98	96
SB-3	J9902556-06	97	99	96
Method Blank	J990902-MB	96	98	96
Laboratory Control Sample	J990902-LCS	103	99	96
Batch QC	J9902570-01MS	91	99	97
Batch QC	J9902570-01MSD	99	99	97
CAS Acceptance Limits:		83-117	81-119	72-128

Approved By: ____ vmk Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
Sample Matrix: Water

Service Request: J9902556
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 9/2/99

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 8260
Units: µg/L (ppb)

Sample Name: Batch QC
Lab Code: Batch QC

						Percent Recovery			
Analyte	**Spike Level MS**	**DMS**	**Sample Result**	**Spike Result MS**	**DMS**	**MS**	**DMS**	**EPA Acceptance Limits**	**Relative Percent Difference**
1,1-Dichloroethene	50	50	ND	35	38	70	76	25-135	<1
Benzene	50	50	ND	46	50	92	100	32-136	8
Trichloroethene	50	50	ND	40	40	80	80	28-134	<1
Toluene	50	50	ND	46	46	92	92	37-129	<1
Chlorobenzene	50	50	ND	44	44	88	88	34-133	<1

Approved By: ______________ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Howard St. Remedial Inv. / 149259.4L.AT
LCS Matrix: Water

Service Request: J9902556
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 9/2/99

Laboratory Control Sample Summary
Volatile Organic Compounds
EPA Method 8260
Units: µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Limits
1,1-Dichloroethene	50	35	70	25-135
Benzene	50	49	98	32-136
Trichloroethene	50	40	80	28-134
Toluene	50	47	94	37-129
Chlorobenzene	50	44	88	34-133

Approved By: ___ Lmk ___ Date: 9/6/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: 8/23-24/99
Date Received: 8/26/99
Date Extracted: 8/27/99
Date Analyzed: 9/1-2/99

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method: EPA 3520C
Analysis Method: 8270C

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery					
			2FPHL	PHLD6	NBZ	2FBPH	246TBPHL	TPH
SB-2	K9905775-001		77	85	88	54	88	12 A
SB-3	K9905775-006		62	56	75	76	80	83
Batch QC	K9905806-002		64	75	84	77	73	94
Batch QC	K9905806-002MS		73	78	86	83	93	102
Batch QC	K9905806-002DMS		77	83	92	87	96	104
Lab Control Sample	KWG9902805-5		77	84	90	82	91	97
Method Blank	KWG9902805-6		74	83	89	82	87	102
CAS Acceptance Limits:			7-105	22-118	32-123	42-122	31-141	21-167

2FPHL 2-Fluorophenol
PHLD6 Phenol-d6
NBZ Nitrobenzene-d5
2FBPH 2-Fluorobiphenyl
246TBPHL 2,4,6-Tribromophenol
TPH p-Terphenyl-d14

A Outside acceptance limits; see case narrative.

Approved By: C (Haines Date: SEP 0 2 1999

S:\R4\S1285\775SVM.AY1 - SUR 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
Sample Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA
Date Extracted: 8/27/99
Date Analyzed: 9/1/99

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Batch QC
Lab Code: K9905806-002MS, K9905806-002DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
?henol	EPA 3520C	8270C	10	200	200	ND	160	160	80	80	31-96	<1	
!-Chlorophenol	EPA 3520C	8270C	10	200	200	ND	160	170	80	85	37-104	6	
:,4-Dichlorobenzene	EPA 3520C	8270C	10	200	200	ND	150	150	75	75	39-100	<1	
¡-Nitrosodi-n-propylamine	EPA 3520C	8270C	10	200	200	ND	160	170	80	85	37-107	6	
,2,4-Trichlorobenzene	EPA 3520C	8270C	10	200	200	ND	150	160	75	80	35-113	6	
-Chloro-3-methylphenol	EPA 3520C	8270C	10	200	200	ND	180	190	90	95	39-118	5	
ıcenaphthene	EPA 3520C	8270C	10	200	200	ND	170	170	85	85	52-102	<1	
-Nitrophenol	EPA 3520C	8270C	25	200	200	ND	200	200	100	100	15-157	<1	
,4-Dinitrotoluene	EPA 3520C	8270C	10	200	200	ND	200	200	100	100	51-114	<1	
entachlorophenol (PCP)	EPA 3520C	8270C	25	200	200	ND	180	180	90	90	18-129	<1	
yrene	EPA 3520C	8270C	10	200	200	ND	190	180	95	90	28-129	5	

›roved By: C Cheires Date: SEP 02 1999

022593 037731SVM.AY1 - DMS 9/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Howard St. Remedial Inv./149259.4L.AT
LCS Matrix: Water

Service Request: K9905775
Date Collected: NA
Date Received: NA
Date Extracted: 8/27/99
Date Analyzed: 9/1/99

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Lab Control Sample
Lab Code: KWG9902805-5
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Phenol	EPA 3520C	8270C	100	88	88	37-102	
2-Chlorophenol	EPA 3520C	8270C	100	91	91	38-108	
1,4-Dichlorobenzene	EPA 3520C	8270C	100	80	80	51-98	
N-Nitrosodi-n-propylamine	EPA 3520C	8270C	100	89	89	43-114	
1,2,4-Trichlorobenzene	EPA 3520C	8270C	100	80	80	42-113	
4-Chloro-3-methylphenol	EPA 3520C	8270C	100	95	95	39-120	
Acenaphthene	EPA 3520C	8270C	100	88	88	50-114	
4-Nitrophenol	EPA 3520C	8270C	100	110	110	15-147	
2,4-Dinitrotoluene	EPA 3520C	8270C	100	100	100	55-123	
Pentachlorophenol (PCP)	EPA 3520C	8270C	100	96	96	34-126	
Pyrene	EPA 3520C	8270C	100	93	93	49-125	

Approved By: CClaying Date: SEP 02 1999

LCS/SVM.AYI - LCS 9/2/99

ATTACHMENT E

Sportsplex Geotechnical Engineering Evaluation, GeoEngineers 2019

Geotechnical Engineering Evaluation

Proposed Sportsplex Project
Spokane, Washington

for

Spokane Public Facilities District

March 6, 2019

GeoEngineers
Earth Science + Technology

Geotechnical Engineering Evaluation

Proposed Sportsplex Project
Spokane, Washington

for
Spokane Public Facilities District

March 6, 2019

GeoEngineers

523 East Second Avenue
Spokane, Washington 99202
509.363.3125

Geotechnical Engineering Evaluation

Proposed Sportsplex Project
Spokane, Washington

File No. 12088-006-03

March 6, 2019

Prepared for:

Spokane Public Facilities District
720 West Mallon Avenue
Spokane, Washington 99201

Attention: Stephanie Curran, CEO

Prepared by:

GeoEngineers, Inc.
523 East Second Avenue
Spokane, Washington 99202
509.363.3125

David R. Lauder, PE
Senior Engineer

Teresa A. Dugger, PE
Associate

DAVID RYAN LAUDER
STATE OF WASHINGTON
42304
REGISTERED
PROFESSIONAL ENGINEER
3/6/19

JRS:DRL:TAD:tlm:tjh:mce

GEOENGINEERS

Table of Contents

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This report presents the results of GeoEngineers, Inc.'s (GeoEngineers') geotechnical engineering evaluation during design for the proposed Spokane Public Facilities District (PFD) Sportsplex project in Spokane, Washington. The project site is situated south of West Dean Avenue, north of the North Bank portion of Riverfront Park, between North Howard Street and North Washington Street, and generally bisected by Cataldo Avenue. The approximate location of the project site is shown in Figure 1, Vicinity Map.

This project was the subject of a preliminary geotechnical engineering evaluation by GeoEngineers, the results of which are presented in our revised report dated January 16, 2019 (GeoEngineers 2019). At the time of our previous report, specific details regarding site layout, grading and design loads were not available. As the project has progressed and design information became available, specific geotechnical engineering-related design recommendations are provided in this report. The conclusions and recommendations contained in this report supersede preliminary conclusions and recommendations contained in our January 16, 2019 preliminary report. We have included the results of our literature review, recent site exploration program and laboratory testing in this report.

We understand the footprint of the proposed Sportsplex building will encompass about 122,000 square feet (about 375 feet north-south by about 325 feet east-west). The main arena portion of the Sportsplex will consist of a pre-engineered metal building encompassing the indoor track/athletic space and stands. The western portion of the Sportsplex (referred to as the "Spine") will have three levels and include office space, dressing rooms, mechanical rooms, loading and storage facilities, an interior concourse and other ancillary spaces. The "Spine" area also will have exterior loading docks and pedestrian terraces and ramps, supported by cast-in-place concrete retaining walls. Finished floor for the main portion of the building will be at Elevation 1,905. (Elevations in this report are based on the North American Vertical Datum (NAVD) 88 datum unless otherwise noted). Finished floor within the lower level of the "Spine," will be at Elevation 1,901.67. Foundation grade likely will be about 2 to 3 feet below finished floor grade.

Existing site grades range from about Elevation 1,902 to 1,905 within the central and southern portions of the proposed building footprint (within and south of Cataldo Avenue). North of Cataldo Avenue, existing site grades slope down to about Elevation 1,894 near the northwestern edge of the proposed building. Therefore, cuts of about 1 to 5 feet will be required from Cataldo Avenue south to establish finished floor subgrade elevations. North of Cataldo Avenue, upwards of about 8 to 10 feet of structural fill will be required to establish finished floor subgrades. Two existing buildings (the Carnation Dairy building and Dance Studio building) currently occupy portions of the proposed building footprint north of Cataldo Avenue and will be demolished to make room for the Sportsplex. The approximate locations of proposed improvements relative to existing site features are shown in the Figure 2, Site Plan.

Additional site improvement likely will include installation of new underground utilities, exterior site grading, and construction of new landscaping and hardscape. Exterior site grading plans were not available at the time we prepared this report. Although, we anticipate site grading similar to that described above for the building will be required to establish final exterior site grades.

Foundation loads for the proposed Sportsplex were provided by Integrus Architecture and range from about 20 kips to about 425 kips for individual (column) foundations. Foundations loads for the continuous (wall) foundations were not provided at the time of this report, although we anticipate such loads will be light to moderate, generally less than about 5 kips per lineal foot.

2.0 SITE BACKGROUND

The property along the south side of Cataldo Avenue was previously occupied by a former building and gravel storage yard/parking area associated with the Carnation Dairy. The former building was located in the southeast portion of the area south of Cataldo Avenue. The building was demolished sometime between 2012 and 2013. The existing approximately 15,000-square-foot Carnation Dairy building was reportedly built in 1914 as a garage. A smaller office building also occupied the site, located just north of Cataldo Avenue. This smaller building was demolished sometime between 2002 and 2003.

In April and August 1999, CH2MHill conducted multiple Phase II environmental site assessments (ESAs) at the property that included advancing test pits and hollow-stem auger (HSA) borings (CH2M 1999a and 1999b). These Phase II ESAs included investigation of two underground storage tanks (USTs) that were removed from west of Carnation Dairy in the early to mid-1990s. The USTs were suspected of leaking and releasing petroleum contamination in the subsurface. During UST removal, petroleum contaminated soil (PCS) was removed from the site. The results of the Phase II ESAs indicated the presence of lead and petroleum in soil greater than Washington State cleanup levels near Carnation Dairy. Diesel petroleum greater than the Washington State cleanup level was also identified in groundwater near the former USTs.

3.0 SCOPE OF SERVICES

The purpose of our services was to provide geotechnical engineering recommendations for design and construction of the proposed Sportsplex. Our recommendations are based on review of existing information, subsurface exploration, laboratory testing and engineering analysis completed during the initial phase of this project. We performed our services in accordance with our Agreement with the Spokane Public Facilities District dated February 18, 2019. Our specific scope of services included:

1. Recommendations for design and construction of foundations. Based on subsurface conditions encountered at the site, we anticipate foundations could consist of a combination of shallow spread footings and deep foundations.
   - For shallow spread footings, we provide recommendations for allowable soil and rock bearing pressures; minimum width and depth criteria; passive earth pressures and coefficient of friction for estimating resistance to lateral loads; modulus of vertical subgrade reaction; and recommendations for preparation of soil or rock at foundation grade, including treatment of unsuitable soil that might be encountered at foundation grade. We also provide estimates of foundation settlement.
   - For deep foundations, we provide options for driven low-displacement piles (H-piles) including: allowable vertical and lateral pile or shaft capacity; estimates of pile response to vertical and lateral loads, group effects and minimum pile or shaft spacing; installation criteria such as minimum embedment depths and minimum hammer criteria (if applicable); and recommendations for establish driving criteria.
2. Recommendations for design and construction of retaining walls or subsurface foundation walls including: lateral earth pressures for the active, at-rest and passive earth pressure states of stress, and recommendations for wall backfill and drainage.

3. Recommendations for seismic design criteria based on the International Building Code (IBC). Specifically, we will provide a recommended seismic site class for use in seismic design.
4. Recommendations for design and construction of slabs-on-grade, including preparation of subgrade and discussion of incorporation of a vapor retarder below the slab.
5. Recommendations for thickness of hot-mix asphalt (HMA) pavement for light-duty and heavy-duty areas; and recommendations for thickness of portland cement concrete (PCC) pavements in heavy-duty areas.
6. An evaluation of the feasibility of on-site infiltration of post-development stormwater. Our evaluation is based on both geotechnical and environmental considerations. We provide recommendations for design infiltration rates of drywell outflow rates, as well as limitations as to the quantity of stormwater that can be infiltrated.
7. Recommendations for site preparation and earthwork, including: criteria for clearing and stripping; an evaluation of the characteristics and excavation feasibility for soil and rock that underlies the site; an evaluation of the suitability of on-site soil for use as structural fill from both a geotechnical and environmental standpoint; guidance for handling and testing of on-site soil intended for off-site disposal; gradation criteria for imported fill; guidance for preparation of subgrade soil; which will support hardscape and pavements; and criteria for structural fill placement and compaction. Our recommendations include criteria pertinent to a Soil Management Plan, outlining criteria for handling, sampling and disposal of site soil from and environmental standpoint.

4.0 SITE SURFACE CONDITIONS

The project site is generally bounded by: West Dean Avenue to the north; the North Bank portion of Riverfront Park to the south: North Howard Street and several existing developed parcels to the west; and North Washington Street and two developed parcels to the east. West Cataldo Avenue generally bisects the site in an east-west orientation.

Surface conditions on the north half of the site include: two existing attached buildings in the north-central portion of the site: the Carnation Dairy building and the adjacent Spokane Dance Studio building; gravel-surfaced access and storage areas are located on the east and west sides of the buildings that slope down about 8 to 10 feet vertically from West Cataldo Avenue towards West Dean Avenue (a rock retaining wall provides grade separation between the lower areas of the site and West Dean Avenue); asphalt concrete (AC) paved parking areas and a basalt rock outcrop are located in the northeast portion of the site.

Surface conditions on the south half of the site predominantly consist of gravel-surfaced parking areas. A basalt rock outcrop/bluff provides grade separation of about 10 to 20 feet between the parking areas and the lower North Bank portion of Riverfront Park. The approximate locations of existing site features are shown in Figure 2.

5.0 SITE SUBSURFACE CONDITIONS

5.1. Field Activities

As part of conceptual-phase design activities, we completed a literature review of the site and adjacent surrounding areas. Based on the results of our literature review, conceptual site layouts, and in coordination with Lydig Construction, we explored subsurface conditions on October 25 and 26, 2018 by drilling 16 borings (B-1 through B-16) using a CME 75, truck-mounted hollow-stem auger drill rig with rock coring capabilities. The borings were advanced to depths in the range of about 1 to 29 feet below ground surface (bgs). Locations of previous explorations identified during the literature review and our supplemental explorations relative to existing site features are shown in Figure 2.

Representative soil and rock samples from the borings were returned to our laboratory for examination. Detailed descriptions of our site exploration program along with exploration logs are presented in Appendix A, Field Methods, Boring Logs and Geotechnical Laboratory Testing.

Following completion of the drilling program, subsurface conditions were further explored by conducting a geophysical survey to estimate depth to rock below the site. The survey was conducted by Sage Earth Sciences under a subconsultant agreement with GeoEngineers. The results of the survey are presented in Appendix B, Geophysical Survey Report.

Because permission was not granted at the time of our field work to access several parcels east of the Dance Studio and the presence of the existing buildings themselves, portions of the site were not available for subsurface explorations and the geophysical survey. The survey lines were laid out based on site access conditions at the time of the survey. These areas represent a data gap in characterization of subsurface conditions within the northcentral and northeastern portions of the site.

5.2. Subsurface Conditions

At the locations of most of our borings, we encountered granular fill consisting of loose to dense gravel with sand and variable silt, cobble and boulder content (and occasional debris), overlying apparent in-place basalt rock. At some of the boring locations, the surface of the basalt rock was fractured, and we were able to advance the augers about 4 inches to 1½ feet into the rock. At the location of boring B-11, following auger refusal, we advanced the boring about 5 feet into the basalt rock using rock coring methods. Based on our experience in the project area and review of exposed rock, the degree of fracturing/weathering of basalt rock in the area likely varies, ranging from highly weathered and fractured, to relatively intact and unfractured.

The thickness of the fill and/or natural soil deposits overlying the basalt was generally less than about 1 to 3 feet at most of our exploration locations. Exceptions included borings B-4, B-8 and B-9.

- At the location of boring B-4, we encountered fill consisting of dense gravel with silt, sand, cobbles and boulders, which extended to the depth explored (approximately 6½ feet bgs).
- At the location of boring B-8, below about 6 feet of fill, we encountered a natural deposit of loose to medium dense gravel with sand and occasional cobbles, which extended to a depth of about 29 feet bgs.

- At the location of boring B-9, we encountered a layer of fill consisting of loose to medium dense silty sand with debris, which extended to a depth of about 6½ feet bgs. Below the fill, we encountered a layer of silty sand with gravel and occasional cobbles, which extended to a depth of about 8½ feet bgs.

Results of the geophysical survey suggest that basalt rock is present below most of the site at relatively shallow depths (less than about 5 feet). The survey results indicate that north of Cataldo Avenue and west of the existing basalt outcrop located within the northeast portion of the site, the top of rock surface slopes downwards towards a closed depression situated near the northwest of the Carnation Dairy building, which generally corresponds to previous and recent explorations. Note that the estimated depth to rock provided in the geophysical figures provided in Appendix B are based on interpretation of widely-spaced seismic refraction data and correlated to boring data. The actual depth to rock at any location could vary from what is estimated from the geophysical survey. In our experience, differences between estimated rock depths and actual depths are generally within about 1 to 2 feet.

5.3. Groundwater Conditions

We encountered groundwater at the location of boring B-8 at the time of drilling at a depth of about 27.6 feet bgs. This depth generally corresponds to groundwater depths encountered in previous explorations conducted in the vicinity of B-8. Previous explorations and analysis by others suggest that a closed depression on top of the basalt rock is present near the northwest corner of the Carnation Dairy building, and that a zone of perched groundwater is situated on top of the basalt surface. Perched groundwater elevations in this area of the site likely fluctuate seasonally, and from year to year depending on infiltration of stormwater, and other forms of natural and artificial recharge.

We did not encounter groundwater during exploration at the locations of the other explorations. However, in our experience, groundwater can become perched on top of and within low-permeability confining layers such as basalt rock, as described above. Therefore, it is possible that perched groundwater could be encountered in other areas on top of or within depressions in the basalt rock that underlies the site.

6.0 CHEMICAL ANALYTICAL RESULTS

Eight soil samples collected from our borings were submitted to TestAmerica laboratories for analyses of select analytes. The analytical testing program was selected based on the results of field screening for petroleum hydrocarbons, review of previous environmental sampling and testing conducted by others on the site and our experience on the adjacent Riverfront Park site. Based on our review of available information, eight representative soil samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) using Environmental Protection Agency (EPA) Method 8270, Resource Conservation and Recovery Act (RCRA) 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using EPA 6000/7000 series methods. One soil sample also was analyzed for petroleum hydrocarbons using NWTPH-Gx and NWTPH-Dx methods, and volatile organic compounds (VOCs) using EPA method 8260. This sample was collected in boring B-8, drilled near the northwest corner of the Carnation Dairy building, near where previous reports indicate that underground storage tanks were removed.

Results of field screening indicated possible petroleum contamination remains within the soil at the site. Full laboratory test results are presented in Table C-1, October 2018 Soil Data in Appendix Chemical Analysis Laboratory Results and Data Quality Review. A copy of the analytical test reports also are presented in Appendix C. The following summarizes the results from the 2018 exploration program:

- Three of the eight soil samples tested [B-4(1-2.5), B-9(3.5-5) and B-16(1-2.5)] contained carcinogenic PAHs (cPAHS) at concentrations [106.72 to 153.4 micrograms per kilogram (µg/kg)] greater than the state of Washington Model Toxics Control Act (MTCA) Method A cleanup level for unrestricted land use (100 µg/kg).
- The soil sample tested for petroleum hydrocarbons, B-8(28.5-30), contained gasoline, diesel and heavy-oil petroleum hydrocarbons, but at concentrations less than the applicable MTCA Method A cleanup levels for unrestricted land use. VOCs were not detected in the sample.
- One soil sample, B-9(3.5-5), also contained cadmium (11 milligrams per kilogram [mg/kg]) and lead (1,000 mg/kg) at concentrations exceeding the MTCA Method A cleanup level for unrestricted land use (2 mg/kg and 250 mg/kg for cadmium and lead, respectively). This soil sample contained more silt and a larger percentage of debris than encountered in other explorations.

Based on review of the previous reports, boring B-9 was drilled within the footprint of the former office building located north of Cataldo Avenue that was demolished sometime between 2002 and 2003.

Soil disposed off-site with a lead concentration of 1,000 mg/kg or higher can be considered dangerous waste in the State of Washington unless supplemental analytical testing is conducted, and the results of the supplemental testing indicate the soil does not designate as Dangerous Waste. Soil from B-9 at a depth of 3 to 5.5 feet was submitted for further analysis including toxicity characteristic leaching procedure (TCLP) in accordance with EPA Method 6010C and bioassay analysis per Washington State Department of Ecology (Ecology) Method 80-12. These test methods are used to see if the soil designates as a State of Washington Dangerous Waste. The results of the TCLP and bioassay testing indicated the soil does not designate as a dangerous waste.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our geotechnical engineering evaluation and limited environmental assessment of the site, we believe the subsurface conditions are suitable for support of the proposed improvements, provided recommendations in this report are followed during design and construction. The following presents a brief description of geotechnical and environmental considerations for this project:

- Basalt rock is present below most of the site at shallow depths (less than about 1 to 3 feet). Depth to rock is greater within the northwest portion of the site (south of Dean Avenue and west of the Carnation Dairy building), extending to a maximum depth on the order of about 30 feet below current site grade. The ability to excavate in-place rock likely varies across the site. Portions of the rock might be sufficiently weathered and fractured to permit excavation using conventional large excavators with toothed buckets or rippers; while other areas might require use of pneumatic hammers, pre-drilling with or without use of expansive grout, or drilling and blasting to efficiently excavate rock.
- The contractor should be prepared to dewater excavations within the rock that could collect surface water runoff during construction. Additionally, because much of the building will be situated on top of in-place basalt we recommend perimeter foundation drains be used to collect post-development water that might collect on top of the rock.
- Structural fill will be required to establish final site grades, particularly within the northern portions of the site. Existing site soil encountered in our explorations is generally suitable for reuse as structural

fill from a geotechnical standpoint. However, portions of the site soil might contain excessive debris or other deleterious material that could render it unsuitable for reuse. Additionally, some of the soil contains sufficient fines (silt- and clay-sized soil particles) that make it moisture sensitive. Therefore, some of the soil will be difficult to properly work or compact if the moisture content at the time of earthwork is more than about 2 to 4 percentage points wet or dry of optimum.

- Results of limited environmental testing indicate that portions of the site soil contain contaminants (principally metals and PAHs) at concentrations exceeding state of Washington MTCA Method A cleanup levels for unrestricted land use. These contaminants are common in the downtown area of Spokane. These contaminants are generally randomly dispersed throughout fill soils. It is also possible that petroleum-contaminated soil could be encountered in areas of the site not explored. In particular, documentation in previous reports indicates an area of petroleum-contaminated soil was encountered near the northwest and southeast corners of the Carnation Dairy building. Petroleum-contaminated soil, if encountered, should not be reused as structural fill and should be properly disposed off-site. In our opinion, soil that contains metals and PAHs at concentrations greater than MTCA Method A cleanup levels for unrestricted land use can be reused on site as structural fill, provided it is properly handled, proper engineering controls are used in design and construction (specifically that contaminated soil is capped to reduce potential pathways for humans and other ecological receptors), and reuse is properly documented. In landscape areas where site soil will not be capped by the building, hardscape or pavement, we recommend placing at least 12 inches of imported fill to reduce exposure pathways to possibly contaminated site soil. A Soil Management Plan is included in Appendix D, Soil Management Plan which provides guidance on handling, testing and reuse of site soil from an environmental standpoint.
- Excavated rock also should be suitable for reuse as structural fill, provided it is screened or crushed to meet applicable gradation criteria.
- Much of the proposed building likely will be founded directly on rock, while the north portions of the proposed building will be underlain by a combination of new fill required to establish final grades, existing fill and natural soil deposits. In particular, depth to rock near the northwest corner of the proposed building is estimated to be in the range of about 10 to 30 feet below existing ground surface (or about 10 to 40 feet below proposed finished floor grade). The rock and overlying soil exhibit large differences in strength and compressibility. Additionally, the on-site fill soil and natural sand and gravel deposits also exhibit variable strength and compressibility characteristics. Shallow spread footings may be used to support foundation loads provided existing fill is removed from below foundation locations to expose in-place rock or natural sand and gravel deposits, and replaced with suitable structural fill, **provided up to 1 inch of total and differential settlement is acceptable**. Otherwise, alternative foundation support options such as use of rigid inclusions or deep foundations should be considered where rock is deeper than foundation grade.
- Site soil should be suitable for support of slab-on-grade floors.
- Most of the site is not suitable for infiltration of post-development stormwater given the shallow depth to rock. Limited infiltration may be feasible in the northwest corner of the site, where a substantial thickness of overburden soil is present on top of rock. Post-development infiltration should not exceed current flow rates and volumes.
- Existing geotechnical data gaps remain in the footprint of the Carnation Dairy building and the property associated with the Dance Studio. We recommend conducting follow-up subsurface explorations within

the property currently associated with the Dance Studio and within the footprint of the Carnation Dairy building (if schedule allows) after it is demolished.

- These and other considerations are discussed in the following sections of this report. This report should be read in its entirety to fully understand geotechnical and environmental design, and construction considerations and recommendations.

7.1. Contaminated Soil Considerations

Results of soil sampling and analytical testing indicate portions of the site fill soil is contaminated with PAHs and metals at concentrations exceeding State of Washington MTCA Method A cleanup levels for unrestricted land use. Given the elevated costs associated with off-site disposal of contaminated soil, we suggest earthwork plans be developed to reuse existing site soil to the extent practicable.

Based on the results of our sampling and experience in the project area, metal and PAH contamination is randomly distributed, i.e. not the result of a point source, and cannot be detected in the field using visual field screening techniques. Therefore, defining the vertical and lateral extent of the contamination is very difficult, to impossible. Although, metal- and PAH-contaminated soils are generally more prevalent within soil containing significant debris.

Therefore, we recommend, to the extent practicable, on-site soil be reused as structural fill to reduce costs associated with off-site disposal at a regulated landfill and/or to reduce the potential long-term risk to the PFD associated with transfer of soil to a non-regulated disposal location. If portions of the on-site soil will be designated for off-site disposal, we recommend it be stockpiled and sampled for contaminants of concern in accordance with applicable Ecology and EPA guidelines for stockpile sampling. The results of the stockpile sampling should be used to determine suitable off-site disposal options. For example, if the soil contains contaminants at concentrations exceeding applicable MTCA cleanup levels, it must be disposed at a regulated landfill such as Waste Management's Graham Road Facility in Medical Lake, Washington. However, the soil can be transported to a non-regulated disposal location if the results of the stockpile sampling and testing indicate the soil does not contain contaminants at concentrations exceeding applicable MTCA cleanup levels. We recommend to the extent practicable, that soil containing obvious signs of debris, such as ash, brick, concrete, etc., be segregated and stockpiled separately from other site soil intended for off-site disposal. For budget estimating purposes, we recommend assuming soil intended for off-site disposal may be disposed at the Graham Road Landfill facility.

Additionally, it is possible that petroleum-contaminated soil could be encountered during earthwork activities, particularly near the locations of previous fuel dispensers located at the Carnation Dairy building (northwest and southeast corners of the building). Review of historic information indicates that while cleanup activities occurred in these areas, it is possible that petroleum-contaminated soil remains in-place below the existing building, which would have been inaccessible during those previous cleanup activities. If petroleum-contaminated soil is encountered during demolition and/or construction activities, we recommend that it be removed from within the building footprint to reduce the potential for vapor intrusion into the building. Preliminarily, we recommend that petroleum-contaminated soil be disposed off-site at a regulated landfill facility, such as Waste Management's Graham Road Landfill Facility.

Soil should be appropriately handled in accordance with the Soil Management Plan provided in Appendix D.

7.2. Site Preparation and Earthwork

We anticipate initial site preparation and earthwork operations could include: (1) demolition and removal of existing buildings; (2) demolition and removal of existing pavement and hardscape; (3) clearing, stripping and grubbing; (4) excavation and removal or relocation of existing underground utilities; (5) site grading to establish pavement, hardscape and slab-on-grade floor subgrades; and (6) excavation to establish proposed foundation grades.

Site preparation and earthwork within the limits of the proposed improvements will require cutting and filling to establish proposed foundation, pavement and floor slab subgrade. Our specific recommendations for site preparation and earthwork are presented in the following sections. All site preparation procedures, excavation, placement and disposal of soil from the project should be handled in accordance with the Soil Management Plan provided in Appendix D.

7.2.1. Initial Site Preparation

Existing surface and subsurface structures (such as foundations, slabs, active or abandoned underground utilities, potential remnant structures from previous site development, pavements and hardscape) are present within the proposed improvement areas. We recommend these structures be excavated and completely removed. Existing active underground utilities should be excavated and relocated outside of improvement areas. Abandoned underground utilities should be excavated and removed or left in place and backfilled with lean concrete or grout. The resulting excavations and voids should be backfilled with structural fill, as defined in the following section of this report. Demolition debris should be removed and disposed of off-site in accordance with local, state and federal regulations. Existing concrete and pavement may be recycled for reuse on-site as structural fill. Recycled concrete and asphalt should be processed (crushed, screened and possibly mixed with other structural fil) to meet applicable requirements as defined in the *Washington State Department of Transportation (WSDOT) Standard Specifications* Section 9-03.21, and the gradation criteria for the intended recycled concrete or asphalt material.

Relatively limited vegetation, including trees, is located on the site. Vegetation within proposed building and hardscape areas should be cleared and stumps, root wads and roots that are greater than about ½ inch in diameter should be grubbed and removed. Excavations to remove stumps, root wads and roots should be backfilled with structural fill. Appropriate precautions should be taken to protect trees intended to be left in place.

7.2.2. General Grading and Excavation

In our opinion, site soil can be excavated using conventional excavating equipment such as backhoes, trackhoes or dozers. The fill located at the site contains cobbles, and possibly boulders. The contractor should be prepared to excavate into and remove such oversize material. Excavation of the existing on-site fill soil should be performed by contractors trained and qualified in working with contaminated soil.

Portions of the site soil are moisture sensitive and will be difficult to work or compact if moisture contents are greater or less than the optimum moisture content by about 2 to 4 percentage points. Accordingly, earthwork during wet weather should be avoided, if possible. If earthwork activities cause excessive subgrade disturbance, replacement with structural fill might be necessary.

Disturbance to a greater depth should be expected when site preparation work is conducted during periods of wet weather, or if the soil moisture content is near saturation. Accordingly, if earthwork activities are performed during wet weather, we recommend that the project specifications and budget include provisions for removal of unsuitable material and importing and compacting additional structural fill.

Where excavations extend below the top of rock, we anticipate excavation will be difficult. Based on our experience with similar projects, the degree of weathering and fracturing of the in-place rock underlying the site likely is highly variable. The upper several feet of rock could be highly fractured, and conventional large excavation equipment such as tracked excavators with toothed buckets or rippers, or dozers with rippers could be used to excavate the rock. However, other portions of near surface rock, or rock more than several feet below top of rock surface, could be significantly more competent, and require considerable effort by the excavation contractor to excavate. Use of pneumatic hammers, pre-drilling followed by removal with pneumatic hammers, or blasting might be required to efficiently remove rock with low fracture density. If competent, relatively unfractured rock is encountered, use of pneumatic hammers alone to excavate could take a significant amount of time. If grading for floor slab areas results in creation of rock pockets (isolated topographic depressions within rock that could store shallow perched water), those rock pockets should be drained by trenching to create a hydraulic connection to a suitable discharge point or backfilled with concrete to create a generally flat surface. Trenches, if selected, should be backfilled with free-draining structural fill.

7.2.3. Subgrade and Foundation Grade Preparation

Rock exposed at foundation grade should be thoroughly cleaned to remove loose soil and other deleterious matter. Our experience is that a vacuum truck is effective for preparing rock surfaces. The prepared rock surface should not exceed a slope of 6H:1V (horizontal to vertical). If the exposed rock has a slope greater than 6H:1V exposed rock within the foundation footprint should be removed to provide a level bearing surface meeting the maximum allowable slope criterion. Additionally, elevated, pointed or protruding portions of exposed rock also should be removed from within the foundation footprint. Concrete may be placed directly on the prepared rock surface, or on a leveling pad of compacted crushed surfacing base course (CSBC), controlled density fill (CDF) or concrete. Note that design bearing pressures presented in Section 7.5.1 are dependent on the type and thickness of the bearing pad. For footings designed for rock bearing capacities, the maximum allowable bearing pad of CSBC is 6 inches. If a thicker bearing pad is required, concrete should be used to establish foundation grade.

Existing fill soil should be completely removed from below shallow spread footings and replaced with structural fill. The lateral limits of overexcavation below foundation grade depends on the type of structural fill used to backfill below footings. Structural fill placed below footings should consist of either CSBC, CDF or concrete. If CSBC is used, excavation to remove existing fill should extend laterally a distance of at least one-half the depth of excavation below foundation grade (i.e. the limits of the excavation at the bottom of the hole at a minimum should equal the width of the footing plus the depth of excavation). If CDF or concrete is used to backfill below foundations, excavation to remove existing fill should extend laterally at least 2 feet beyond footing perimeters.

Existing fill soil may remain in-place below floor slab areas provided it is properly compacted and results of proof-rolling indicate the existing fill is suitable for support of floor slabs.

Soil exposed at working subgrade should be compacted to a dense condition before placing structural fill. To that end, soil exposed within the upper 12 inches of working subgrade should be compacted to the following criteria:

- At least 90 percent of maximum dry density (MDD) based on the ASTM International (ASTM) D 1558 laboratory test procedure for soil more than 2 feet below finished pavement or hardscape subgrade
- At least 95 percent of MDD for soil less than 2 feet below finished pavement and hardscape subgrades and below all floor slabs and foundations.
- If soil exposed at working subgrade in pavement, floor slab and hardscape areas is too granular to test, we recommend soil exposed at working subgrade within floor slab, pavement and hardscape areas be compacted to a dense condition with at least 3 passes of a minimum 10-ton vibratory roller with a minimum dynamic force of 30,000 pounds. Following compaction, the prepared subgrade within floor slab, pavement and hardscape areas should be proof-rolled using a minimum 25,000-pound gross vehicle weight (GVW), single axle truck and observed by a representative of GeoEngineers.
- Soil disturbed at the bottom of working subgrade in foundation excavations should be recompacted to a firm condition. If soil exposed at the bottom of foundation excavations is too granular to test, it should be recompacted to a firm condition using suitable compaction equipment such as a sheepsfoot roller or vibratory plate compactor on the end of an excavator, or other suitable compaction equipment that can safely access the bottom of the excavation.

A representative of GeoEngineers should evaluate soil conditions at working subgrade and within foundation excavations before placing structural fill, formwork or reinforcing steel. Evaluation of subgrade preparation should be accomplished through in-place density testing of the prepared areas and observation of proof-rolling as previously described. Alternatively, probing may be used. The most appropriate method for evaluating subgrade preparation should be determined by the geotechnical engineer-of-record at the time earthwork is performed. It will be critical for the geotechnical engineer to be on-site during foundation excavation to observe soil conditions and confirm that excavations have extended to suitable depths to expose competent natural gravel deposits and to sufficient lateral extents such that the zone of stress influence below foundation grade are encompassed by structural fill.

Areas identified as soft or unstable during subgrade preparation observations should be overexcavated to firm bearing, or a depth of at least 2 feet below finished floor, pavement and hardscape subgrade, whichever is less, and replaced with suitable structural fill. Areas identified as soft or unstable below foundations should be completely removed to expose suitable bearing soil or rock.

If soil is still unstable at working subgrade within floor slab, hardscape and pavement areas following overexcavation, a stabilization fabric such as Mirafi 180N or equivalent should be placed on top of working subgrade before placing structural fill to establish final subgrade elevations.

7.3. Structural Fill

Soil used as fill to support foundations, slab-on-grade floors, hardscape and paved areas is classified as structural fill for the purposes of this report. Structural fill material requirements vary depending upon its use as described below. Structural fill, whether on-site soil or imported, should be free of debris, organic material, frozen soil and particles larger than 6 inches in maximum dimension. In addition, and as indicated in other sections of this report, granular structural fill is only suitable when fill placement and compaction can be conducted in the dry.

7.3.1. Use of On-Site Soil as Structural Fill

In our opinion, most of the on-site soil has the characteristics to be suitable for re-use as structural fill below floor slabs, pavement and hardscape from a geotechnical standpoint. Reuse of on-site soil also will be based on environmental criteria in accordance with the Soil Management Plan provided in Appendix D. Specifically, the type(s) and concentration(s) of contaminant(s) present within excavated on-site soil will determine whether the fill soil is suitable for reuse as structural fill, and where such material can be placed. The Soil Management Plan outlines characterization methods and limitations on reuse from an environmental standpoint.

Excavated rock may be reused as structural fill provided individual rock fragments are less than 6 inches in maximum dimension and the rock is uniformly mixed with other granular structural fill. Otherwise, excavated rock should be crushed to meet this criterion or properly disposed of off-site.

Portions of the existing fill soil are moisture sensitive and will be difficult to properly work or compact during extended periods of wet weather. Given the potential costs of off-site disposal of existing fill, it will be crucial for the proper handling and moisture-conditioning of on-site soil during earthwork activities. Additionally, portions of the fill soil likely contain oversized material that should be removed before being reused as structural fill.

As indicated previously, recycled concrete and asphalt pavement may be reused as structural fill below floor slabs and hardscape, provided it is processed (crushed and screened as needed) to meet the gradation criteria outlined in Section 9-03.21 of the *WSDOT Standard Specifications* and the criteria outlined in Section 7.3.2 below.

7.3.2. Imported Structural Fill

Imported structural fill, where required, should meet the following criteria:

- Imported structural fill placed below foundations and as base course for pavements should consist of CSBC meeting criteria in section 9-03.9(3) of the current *WSDOT Standard Specifications*. The intent of using a higher quality imported granular structural fill material below footings is to reduce the potential for differential settlement between footings bearing on granular material (structural fill and natural gravel deposits) and footings bearing directly on rock.
- Imported structural fill placed below pavements and hardscape, or behind retaining or subsurface foundation walls should consist of a well-graded sand or sand and gravel mixture with less than about 10 percent fines. The following gradations generally meet these criteria as described in the *WSDOT Standard Specifications*:
    - "Gravel Borrow" in Section 9-03.14(1).
    - "Select Borrow" in Section 9-03.14(2), with the added criteria of being well-graded.
    - "Foundation Material Class A and B" in Section 9-03.17.

  "Gravel Borrow" and "Select Borrow" will be suitable for use as structural fill during dry weather conditions only. If structural fill is placed during wet weather, the fines content of the structural fill should be less than 5 percent. Other gradations may be used if they meet the general criteria stated above and are approved by the Geotechnical Engineer-of-Record.

- Imported structural fill placed as capillary break material below floor slabs should consist of 1½-inch-minus free-draining crushed gravel with negligible sand or silt. Material in conformance with "Section 9-03.1(4) C, Grading No. 57" of the *WSDOT Standard Specifications* generally meets these criteria. Alternative guidelines may be used if approved by the Geotechnical Engineer-of-Record.
- Imported structural fill in drainage zones, such as behind retaining walls should conform to *WSDOT Standard Specification 9-03.12(4)* "Gravel Backfill for Drains."
- Imported structural fill placed as trench backfill outside of building, pavement and hardscape areas should consist of material meeting criteria for "Bank Run Gravel for Trench Backfill" in Section 9-03.19 of the *WSDOT Standard Specifications*.

7.3.3. Fill Placement and Compaction Criteria

Structural fill should be placed in loose lifts not exceeding 8 inches in thickness (or a thickness compatible with the compaction equipment used, not to exceed 12 inches) and mechanically compacted to a firm condition. Each lift should be conditioned to the proper moisture content and compacted to the specified density before placing subsequent lifts. We recommend structural fill be compacted to the following criteria based on the ASTM D 1557 laboratory test procedure:

- On-site soil used as structural fill placed within the proposed building areas, regardless of depth below floor subgrade or foundation grade, should be compacted to at least 95 percent of the previously mentioned MDD.
- Structural fill placed adjacent to and within a distance of 2.5D of foundation elements (where D is the embedded depth of the foundation element), which are designed to resist lateral loads should be compacted to at least 95 percent of the MDD.
- Structural fill placed adjacent to and within a distance of H of retaining walls (where H is the height of soil retained behind the wall), should be compacted in the range of 90 to 92 percent of the MDD, unless retained soil will support pavement or structures. Then structural fill should be compacted to meet criteria as outlined in this report. Care should be taken by the contractor not to overstress the walls during compaction. Compaction within 5 feet of the back of the walls should be limited to light-weight compaction equipment. This likely will require the lift thickness be reduced in order to achieve compaction criteria.
- Structural fill in roadway, parking areas and below exterior hardscapes, including utility trench backfill, should be compacted to at least 90 percent of the MDD, except the upper 2 feet of fill below final subgrade should be compacted to a minimum 95 percent of the MDD.
- Structural fill placed as capillary break for floor slabs and crushed rock base course for pavements should be compacted to at least 95 percent of the MDD.
- Non-structural fill, such as fill placed in landscaped areas, should be compacted to at least 85 percent of the MDD. In areas intended for future development, a higher degree of compaction should be considered to reduce the settlement potential of the fill soil.

We recommend a representative of GeoEngineers be on site during earthwork operations to observe site preparation and structural fill placement. Soil conditions should be evaluated by in-place density tests, visual evaluation, probing and proof-rolling of the structural fill and recompacted on-site soil, as it is prepared, to check for compliance with contract documents and recommendations in this report.

Structural fill that is too granular to test should be compacted using a performance specification. This typically consists of constructing a test strip and conducting in-place density tests at multiple locations along the test strip after each pass of the contractor's compaction equipment. The required minimum number of passes of the compaction equipment is established based on the field density tests when results of a single pass of the compaction equipment results in an increase in the average density of less than ½ pound. Subsequent structural lifts are then compacted using the same lift thickness and minimum number of passes as determined from the test strip. Additional test strips should be conducted if the grain-size distribution of the structural fill or method of compaction changes. Such a determination should be made by the geotechnical engineer. At a minimum, each lift should be compacted by at least 3 passes for each 6 inches of lift thickness using a minimum 10-ton vibratory roller having a dynamic force of at least 30,000 pounds.

7.3.4. Cut and Fill Slopes

In our opinion, excavations in the on-site soil are highly susceptible to sloughing and caving. Excavations deeper than 4 feet should be shored or sloped at stable inclinations if workers are required to enter such excavations. Shoring for excavations must conform to provisions of Title 296 Washington Administrative Code (WAC), Part N, "Excavation, Trenching and Shoring."

In our opinion, the overburden soil at the site classifies as Type C for excavation purposes (Chapter 296-155-664 WAC). The maximum allowable temporary slope for Type C soil is 1.5H:1V for simple excavations less than 20 feet deep located above the groundwater table or seepage zone.

In our opinion, the basalt rock at the site probably classifies as 'stable rock' on the basis of Occupational Safety and Health Administration (OSHA) criteria, implying that essentially vertical cut slopes might be possible. However, actual rock cut slopes might need to be somewhat flatter depending on the quality of the rock encountered at the time of construction. The contractor also should consider how to safely excavate compound temporary slopes in overburden soil and rock.

Temporary cut slope guidance assumes that all surface loads are kept a minimum distance of at least one-half the depth of the cut away from the top of the slope. Flatter slopes will be necessary if surface loads are imposed above the cuts a distance equal to or less than one-half the depth of the cut, or if seepage is present within cuts. It is the contractor's responsibility to monitor and adjust the inclination of temporary excavated slopes and assure site safety during the proposed construction.

Alternatively, temporary shoring should be installed if space constraints limit the depth and/or inclination of cut slopes. Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under Washington Industrial Safety and Health Administration (WISHA) or OSHA regulations, as applicable.

While this report describes certain approaches to excavation, the contract documents should specify that the contractor is responsible for selecting excavation methods, monitoring the excavations for safety, reducing temporary slope inclinations to improve stability and providing shoring, as required, to protect personnel.

We recommend a maximum inclination of 2H:1V for permanent cut and fill slopes. Surface drainage should be directed away from slope areas. Some minor raveling could occur over time. All finished slopes should be covered with topsoil and seeded as soon as possible after earthwork operations are complete to encourage the development of a vegetative cover, or otherwise protected.

7.4. Weather Considerations

As stated previously, portions of the on-site soil are moisture sensitive. As the moisture content of the moisture-sensitive soil increases, the strength decreases. During wet weather, as the soil approaches saturation, it becomes soft and muddy. Performing earthwork in these conditions will lead to disturbance of near-surface soil. During dry weather, the on-site soil should be less susceptible to disturbance and provide better support for construction equipment. In addition, drying of soil that is above its optimum moisture content is most effective during extended periods of warm, dry weather.

The wet weather season generally begins in November and continues through May in eastern Washington. However, periods of wet weather may occur during any time of year. If wet weather earthwork is unavoidable, we recommend that the following steps be taken if surficial soil conditions begin to deteriorate:

- Stop earthwork activities during and immediately after periods of heavy precipitation.
- Grade the ground surface in and around the work area so that areas of ponded water do not develop, and water does not enter and collect in excavations and trenches.
- Accumulated water should be removed from the work area in accordance with the project Stormwater Pollution Prevention Plan (SWPPP).
- Existing slopes with exposed soil and soil stockpiles should be covered with plastic sheeting.
- Areas of uncompacted soil should be sealed by rolling with a smooth-drum roller before precipitation occurs.
- Construction traffic should be restricted to specific areas of the site, preferably areas that are not susceptible to disturbance.
- Construction activities should be scheduled so that the length of time that soil is exposed to moisture is reduced to the extent practical.

7.5. Foundation Support

We anticipate that the approximately southern half of the proposed building can be supported on shallow spread footings bearing on in-place basalt rock, or suitable structural fill overlying in-place rock. North of Cataldo Avenue, existing ground surface slopes down about 9 to 10 feet to a topographic depression located near the northwest corner of the Carnation Dairy building. Additionally, based on the results of previous explorations and our recent explorations and geophysical survey, top of rock also slopes downward from shallow depths south of Cataldo Avenue, to a depth of about 30 feet below existing ground surface near the northwest corner of the proposed building area. (Note that subsurface explorations have not been conducted within the eastern portion of the proposed building footprint north of Cataldo Avenue. Therefore, there is a data gap in this area of the site).

We estimate that foundation grades for the approximate south half of the proposed building (from Cataldo Avenue south) will be within or near in-place rock. We also estimate that foundation grades for the approximate north half of the proposed building could range from about 5 to 40 feet above the top of in-place rock. The overburden soil generally consists of a mixture of uncontrolled fill and natural sand and gravel deposits exhibiting variable strength and compressibility characteristics. As indicated previously based on historical information, two 10,000-gallon underground storage tanks (USTs) were removed from near the northwest corner of the Carnation Dairy building in 1989. Records indicate the excavation to remove the USTs and surrounding petroleum-impacted soil extended to depths of about 15 to 20 feet below site grade. Based on the results of subsequent explorations, backfill does not appear to have been placed in a controlled manner nor compacted to a dense condition. We also encountered loose, uncontrolled fill extending to a depth of about 6 feet in boring B-8; and to a depth of about 6½ feet bgs in our recent boring B-9, advanced within the footprint of a former building located west of the Carnation Dairy building and north of Cataldo Avenue.

We estimate that differential settlement between footings bearing on in-place rock and footings overlying uncontrolled fill could exceed 1 inch. Therefore, in order to provide more uniform bearing conditions and reduce the potential for unacceptable total and differential settlement, foundations should be supported on in-place rock, or structural fill overlying in-place rock or natural sand and gravel deposits. Table 1 below presents a brief summary of foundation options for this project. We recommend the structural engineer coordinate design bearing pressures for each footing with the GeoEngineers and indicate the design bearing pressures on the plans so that appropriate foundation grade preparation procedures for each footing are conducted during construction.

TABLE 1. FOUNDATION DESIGN OPTION SUMMARY

Foundation Option	Approximate Feasible Locations	Design Bearing Pressures or Capacity	Considerations
Footings bearing on rock	From Cataldo Avenue to the south end of the building. Note, depth to rock for some isolated column footings and retaining wall footings on the west side of the structure might be more than 6 inches below foundation grade. For lightly loaded individual and continuous footings on the west side of the building, use of lower bearing pressures might be more efficient	10,000 to 20,000 psf	Footings bearing directly on rock or bearing pad 6 inches thick or less overlying rock
Footings bearing on structural fill overlying in-place rock or natural soil deposits	North of Cataldo Avenue	3,000 to 5,000 psf	Could require overexcavation 15 to 20 feet below existing site grade to remove existing fill from below foundations, and replacement with imported structural fill (CSBC).

Foundation Option	Approximate Feasible Locations	Design Bearing Pressures or Capacity	Considerations
Footings bearing on rigid inclusions	North of Cataldo Avenue	4,000 psf or greater	Eliminates overexcavation requirement. Requires a specialty contractor. Design is a collaborative effort between structural engineer, geotechnical engineer and specialty contractor.
Deep Foundations	North of Cataldo Avenue	Structural capacity of the pile for downward axial capacity of piles end bearing on rock	Piles should be fitted with driving shoes. Pre-construction survey should be conducted along with vibration monitoring during pile installation. Limited uplift and lateral capacity.

Note:

psf = pounds per square foot

7.5.1. Shallow Spread Footings

7.5.1.1. Minimum Width and Embedment

Individual (column) and continuous (wall) footings should be designed with minimum dimensions of 24 inches and 18 inches, respectively. Exterior footings should be embedded at least 24 inches below exterior finished grade for frost protection.

7.5.1.2. Allowable Bearing Pressures

Individual and continuous footings should bear on either: in-place rock; a bearing pad (CSBC, CDF or concrete) overlying in-place rock; or granular structural fill overlying natural gravel deposits. Existing fill soil present at planned foundation grade should be excavated down to in-place rock or natural sand and gravel deposits and replaced with suitable structural fill as outlined in Section 7.2.3 to 7.3.2 of this report. Allowable bearing pressures depend on the material present at foundation grade and type of structural fill used as described below:

- Footings bearing on rock may be designed using an allowable net bearing pressure according to Table 2:

TABLE 2. ALLOWABLE BEARING PRESSURE FOR FOOTINGS ON ROCK

Footing Width (feet)	Allowable Rock Bearing Pressure (psf)
1.5 to 4	10,000
Greater than 4	20,000

- Footings bearing on CDF or lean-mix concrete more than 6 inches thick overlying in-place rock may be designed using an allowable net bearing pressure of 7,000 psf. The lean mix or CDF should extend at least 1 foot beyond the edge of the footing.

- Footings bearing on structural fill consisting of imported CSBC greater than 6 inches thick overlying in-place rock or natural sand and gravel deposits may be designed using an allowable net bearing pressure as indicated in Table 3:

TABLE 3. ALLOWABLE BEARING PRESSURE FOR FOOTINGS ON STRUCTURAL FILL

Footing Width (feet)	Allowable Soil Bearing Pressure (psf)
1.5 to 2	3,000
2 to 4	4,000
Greater than 4	5,000

When dimensioning footings subjected to eccentric loading, a reduced effective area of B’ x L’ should be used. The point of load application should be at the centroid of the reduced effective area. The reduced dimensions for the effective loaded area should be calculated as:

$B' = B - 2e_B$

$L' = L - 2e_L$

Where;

B = width of rectangular footing (ft)

L = length of rectangular footing (ft)

e_B = eccentricity parallel to dimension B (ft)

e_L = eccentricity parallel to dimension L (ft)

When using the effective footing dimensions, footings should be dimensioned based on the following assumptions:

- A uniform bearing pressure on soil;
- A linearly varying, i.e. triangular or trapezoidal as applicable, bearing pressure on rock.

Footings also should be dimensioned such that the eccentricity is less than L/6 or B/6.

7.5.1.3. Settlement

Foundation loading information was provided by Integrus Architecture. Foundations supporting the main arena span are oriented in a north-south direction and spaced about 25 feet on center. Isolated column foundation loads for the main span supports range from about 160 kips per column along the eastern building line, to about 425 kips per column along the “Spine.” Isolated foundation loads along the north and south building lines are smaller, in the range of about 20 to 45 kips, and also are spaced about 25 feet on center. Additional isolated spread footings will be located within the “Spine” area of the building, with loads in the range of about 100 to 200 kips.

Settlement of most shallow spread foundations constructed on in-place rock as recommended above should be negligible, less than about ¼-inch. For footings supporting loads of about 100 to 425 kips bearing on structural fill overlying natural gravel deposits extending to depths of about 20 to 35 feet below foundation grade, we estimate that total settlement could be in the range of about ½-inch to 1-inch. Therefore, we estimate maximum differential foundation settlement from the approximate middle of the building to the north end of the building could be on the order of about 1-inch, while differential settlement between adjacent similarly loaded column footings, or along about 25 feet of continuous wall footing should be less than about ½-inch.

Settlement should occur relatively rapidly, essentially as loads are applied. On this basis, post-construction total and differential settlement should be small, and will be a function of the magnitude of live load. Loose soil or rock not removed from footing excavations, disturbance of soil or rock at foundation grade during construction, or the presence of residual on-site fill not removed from below foundations could result in larger settlements than estimated.

7.5.1.4. Lateral Resistance

The ability of shallow foundations to resist lateral foundation loads is a function of the frictional resistance against the foundation base and the passive resistance which can develop on the face of below-grade elements of the structure as those elements move horizontally into the soil. For foundation grade prepared as recommended herein, the allowable frictional resistance may be computed using a coefficient of friction based on the material present at the footing interface. Table 4 may be used to estimate lateral resistance from friction.

TABLE 4. RECOMMENDED FRICTION COEFFICIENTS FOR LATERAL SLIDING RESISTANCE

Material Present at Bottom of Footing	Allowable Frictional Coefficient
In-place Rock	0.65
Concrete or CDF	0.55
Granular Structural Fill or On-site Gravel	0.45

The values above should be applied to vertical dead load forces for the contact between the bottom of the footing and supporting material.

The allowable passive resistance on the face of footings may be computed using an equivalent fluid density of 300 pounds per cubic foot (pcf), triangular distribution, for on-site soil or imported structural fill. This is based on the condition that backfill placed against embedded elements is compacted to at least 95 percent of the MDD for a distance of at least 2D beyond the edge of the foundation element (where D is the depth from ground surface to the bottom of the foundation element). Note that lateral movement on the order of about 0.002D will be required to mobilize the design passive resistance.

Both the frictional coefficient values presented in Table 4 and the equivalent fluid density value presented above include a safety factor of 1.5.

7.5.2. Rigid Inclusions

Rigid inclusions consist of either augured holes backfilled with CDF or concrete, or aggregate columns installed in augured holes or via vibratory mandrels that are injected with concrete to become a rigid element. Rigid inclusions are an intermediate foundation system between shallow spread footings and deep foundations. Rigid inclusions directly support shallow spread footings by penetrating through compressible overburden soil into stiffer soil or to rock, thereby transmitting foundation loads to more competent bearing materials. They act similar to deep foundations, but without the structural connection between the rigid inclusion elements and footing. Therefore, they do not provide uplift or lateral resistance.

Rigid inclusions allow for use of shallow spread footings while eliminating the requirement for large excavations to remove unsuitable soil. Design of rigid inclusions is typically a collaborative effort between the project structural engineer, geotechnical engineer and specialty rigid inclusion contractor. Typical design bearing pressures in the range of about 4,000 pounds per square foot (psf) or greater can be achieved using rigid inclusions bearing in gravel deposits or rock. Design bearing pressures depend on the diameter and spacing of the inclusions, as well as the supporting characteristics of the bearing layer. For this project, we recommend that rigid inclusions extend at least 5 feet into natural gravel deposits, or to rock, whichever occurs first.

7.5.3. Deep Foundations

Where depth to in-place rock or natural (non-fill) soil deposits below planned foundation grade is greater than about 10 feet, we anticipate the use of deep foundations could be a more cost-effective foundation option than shallow spread footings (when considering the costs associated with overexcavation of existing fill soil and replacement with structural fill). If driven piles are selected as a viable foundation support option, we recommend consideration be given to using driven low-displacement steel piles (H-piles) end bearing on in-place rock.

Depending on final foundation grades, we estimate that depth from foundation grade to top of in-place rock could be in the range of about 8 feet to 35 feet north of Cataldo Avenue. For piles driven to refusal in rock, the downward axial capacity for each pile may be determined based on the structural capacity of the pile. Given the weathered and fractured nature of the top of the rock surface, piles likely could penetrate several feet into rock before reaching refusal. Capacity should be determined in the field based on the results of blow counts.

The uplift capacity will be dependent on the selected pile dimensions and embedment depth. Estimated allowable uplift capacity vs. embedment depth is presented in Table 5 for HP 12 x 53 piles, which is a commonly available pile size. The values presented in Table 5 include a safety factor of about 3. Different pile dimensions will have different uplift capacities.

TABLE 5. UPLIFT CAPACITY OF HP 12 X 53 PILES

Embedment Depth (feet)	Allowable Uplift Capacity (kips)
5	1
10	5
15	10
20	15
25	20
30	30

Lateral capacity also will be dependent on the pile properties, orientation of the pile strong or weak axis relative to the direction of lateral loading, degree of fixity at the pile cap, pile embedment depth, pile group effects, and tolerable lateral movement. For these reasons, pile design for lateral loading is typically an iterative process between the structural engineer and geotechnical engineer. Preliminarily, we estimate minimum embedment depth to achieve pile "fixity" is about 15 feet. Therefore, piles with embedment depths less than 15 feet should not be relied upon for lateral resistance. Piles with a minimum of 15 feet of embedment oriented with the strong axis in the direction of lateral loading should be able to resist lateral loads in the range of about 3 to 8 kips (depending on pile dimensions) with about ½ inch of lateral movement at the pile cap. If additional lateral resistance is required, battered piles could be installed, or passive earth pressure on the face of pile caps could be used to resist lateral loads.

Piles should be fitted with driving shoes suited for end bearing on rock. Wave equation analyses should be conducted to select appropriate hammer energies and establish driving criteria to reduce the potential for overstressing piles during driving, while ensuring sufficient energy is imparted to the piles to properly seat them into rock to achieve the design axial capacity. Provided H-piles are properly fitted with driving shoes, we anticipate most of the piles should be able to be driven to in-place rock. However, contingencies should be included in the project plans and budget to pull piles that encounter refusal on cobbles or boulders short of in-place rock, drill the pile location to remove the obstruction, and re-drive the obstructed pile to rock.

Based on the location of the proposed building relative to existing structures in the project area, we do not anticipate that ground vibrations induced during pile driving should result in damage to nearby structures. However, the threshold of ground vibrations required to induce structural damage is much higher than the ground vibration threshold that can be felt by people. Therefore, it will be critical to provide thorough notifications to occupants of nearby properties to reduce the potential for nuisance complaints. A thorough pre-construction survey of nearby properties also should be conducted to document conditions. Maximum peak ground velocity thresholds should be established in the project specifications, and vibration monitoring should be conducted during pile driving.

7.6. Foundation Drains

Given the presence of low-permeability shallow basalt rock underlying much of the site, we recommend that, at a minimum, perimeter foundation drains be installed adjacent to below-grade areas such as the "Spine." Although, we suggest consideration be given to installation perimeter foundation drains around the entire building, if practicable. Foundation drains should consist of 4-inch-diameter perforated polyvinyl chloride (PVC) or high-density polyethylene (HDPE) pipe, surrounded by at least 6 inches of washed drain rock or drainage sand. The drainage material should be separated from surrounding material by a non-woven geotextile fabric such as Mirafi 140N or equivalent. The invert of the foundation drains should be established at least 6 inches below the bottom of floor slab elevation. Foundation drains should be tight lined to an independent discharge point and not be connected to downspouts or other portions of the site stormwater system. This is to prevent the potential for clogs or other conditions within the stormwater system from backing up and reversing flow into the foundation drains.

7.7. Retaining and Subsurface Foundation Walls

Conventional cast-in-place concrete retaining wall and subsurface foundation wall footings bearing on rock or structural fill prepared as recommended herein may be designed using the allowable bearing pressures presented in the "Foundation Support" Section 7.5.

Cantilevered retaining walls that are allowed to yield during backfilling (active soil pressure) should be designed for lateral pressure based on an equivalent fluid density of 35 pcf if the ground surface behind the wall is level for a distance equal to two times the wall height. This value applies to fill behind the walls that is placed and compacted as recommended below. We recommend rigid retaining walls be designed using an equivalent fluid weight of 55 pcf. This value also is applicable only if the ground surface behind the wall is level for a distance of two times the wall height. Surcharge loads are additive to lateral soil pressures. We should be consulted if surcharge loads are expected to impose additional lateral pressures on retaining walls, or if walls will retain sloping or terraced backfill.

Fill behind retaining walls should be placed as structural fill and conform to suitable gradation specifications. Wall backfill should consist of a well-graded sand or sand and gravel mixture with less than 5 percent passing the U.S. No. 200 sieve. Care must be taken by the contractor to avoid over compaction of fill placed behind retaining walls. When placing and compacting fill within 5 feet of retaining walls, we recommend using hand-operated compaction equipment and a maximum 6-inch-thick lift thickness.

The recommended equivalent fluid densities are based on the condition of a free-draining condition behind retaining walls. For exterior retaining walls and subsurface foundation walls, this may be accomplished by placing an approximate 12-inch-wide zone (chimney drain) of free-draining sand or a sand and gravel mixture with less than about 2 percent fines adjacent to retaining walls. The chimney drain should be separated from general structural wall backfill by a non-woven geotextile such as Mirafi 140N or equal. The chimney drain should be hydraulically connected to weep holes and/or a 4-inch-diameter perforated HDPE or PVC drain pipe that is tight-lined to a suitable discharge point. As an alternative to the granular chimney drain, a pre-fabricated drainage mat such as Miradrain or equivalent may be used as a chimney drain.

7.8. Floor Slab Support

The proposed Sportsplex floor may be supported on-grade, provided it is underlain by properly compacted, on-site soil or structural fill prepared and placed as recommended in the "Site Preparation and Earthwork" Section 7.2 of this report. We recommend the building floor slab be designed using a modulus of vertical subgrade reaction (k) of 200 pounds per cubic inch (pci). Please note that this value is valid for floor slabs designed to resist point loads. The modulus of vertical subgrade reaction varies as a function of size of the loaded area. The equation below may be used to estimate modulus values for slab loads of various widths.

$$K = K_{S1}\ \frac{(B+1)^2}{4B^2}$$

Where K is the modulus of vertical subgrade reaction for loaded area of width B, K_{s1} is the modulus of vertical subgrade reaction for a point load (200 pci), and B is the lateral dimension of the loaded area of the slab. The structural engineer should design the thickness and required reinforcement of the floor slab based on the anticipated structural floor loads.

To retard the upward wicking of moisture beneath the floor slab, we recommend that a capillary break be placed over the subgrade. To that end, we recommend that floor slabs be underlain by at least 4 inches of free-draining crushed rock compacted to a minimum 95 percent of the previously recommended MDD. The crushed rock should meet the criteria outlined in the previous section of this report titled "Structural Fill" Section 7.3.

A vapor retarder consisting of durable plastic sheeting also may be used in areas where the prevention of moisture migration through the building slab-on-grade floor could adversely influence performance of adhesives, which might be used to anchor carpet, tile or other floor finishes to the slab. Given the presence of shallow rock below the building footprint and potential for water to collect within pockets of the rock , we recommend that a vapor retarder, if used, consist of heavy-duty plastic such as a Stego® Wrap 15- to 20-mil barrier or similar. The architect should make the final determinations regarding use of a vapor retarder. Currently, the American Concrete Institute (ACI) does not recommend placing a moisture break layer of sand or crushed rock above plastic vapor retarders unless the building roof is in-place at the time of slab construction. If a moisture break layer is not used, appropriate consideration should be given to the cement type used for the slab concrete, jointing layout and curing operations to reduce the potential for curling of the slab.

7.9. Seismic Considerations

Spectral response acceleration is estimated by classifying the site based on the average soil properties below the site to a depth of 100 feet. Based on the subsurface conditions we encountered in our borings, results of geophysical testing and our understanding of the geologic conditions in the site vicinity, we believe the site should be characterized as Site Class C. This is due in part to the estimated thickness of existing soil located within the northern portions of the site, which extend to depths of about 30 feet below site grade.

7.10. Pavements

Based on the results of our explorations, we anticipate either in-place rock, existing granular soil or imported structural fill will be present at pavement subgrade. In our opinion, in-place rock, properly prepared and compacted on-site soil or structural fill should provide adequate support for proposed pavements. Pavement subgrade should be prepared as outlined in the “Site Preparation and Earthwork” Section 7.2 of this report. Soil placed as structural fill and gravel placed as CSBC within proposed pavement areas should be compacted as outlined in the “Structural Fill” Section 7.3 of this report. We estimate the resilient modulus of properly prepared subgrade should be at least 10,000 pounds per square inch (psi).

Traffic loading information was not available at the time we prepared this report. For design purposes, we assume that light-duty areas will be subjected to automobile traffic, and occasional heavy trucks. We assume that heavy-duty areas will support up to 100 single-panel delivery trucks, 100 buses and 10 semi-truck trailers on a monthly basis.

We recommend pavement materials at the site conform to applicable sections of the *2016 WSDOT Standard Specifications*. Specifically, asphalt surfacing should consist of plant-mixed HMA placed and compacted in general accordance with Sections 5-04 (Hot-Mix Asphalt), 9-02 (Bituminous Materials) and applicable sections of 9-03 (Aggregates) of the *2016 WSDOT Standard Specifications*.

Our recommendations for pavement thickness are presented below in Tables 6 and 7. Pavement thickness designs are based on a 20-year design life for ACP and a 40-year design life for PCC.

TABLE 6. RECOMMENDED HMA PAVEMENT THICKNESS

Pavement Type	HMA inches)	CSBC (inches)
Light-Duty (Automobile Access and Parking)	2.5	4
Heavy-Duty (Heavy Truck Access and Loading/Unloading)	4	6

TABLE 7. RECOMMENDED PCC SECTION

Anticipated Traffic Loading	PCC Thickness (inches)	CSBC Thickness (inches)
Heavy-Duty Access and Loading/Unloading Areas	8	4

For PCC pavement, we recommend maximum longitudinal joint spacing (joints oriented parallel to the direction of travel) of 20 feet and maximum transverse joint spacing (joints oriented perpendicular to the direction of travel) of about 15 feet. Sawed joints (contraction joints) should be about 1-inch deep and 3/16- to 5/16-inch wide. Panel joints in the direction of travel (transverse joints) should be doweled using corrosion-resistant 1¼ -inch-diameter dowel bars conforming to Section 9-07.5(2) of the *WSDOT Standard Specifications*. The bars should be centered on construction joints and the center-to-center dowel spacing should be about 12 inches. Longitudinal joints should be tied together with No. 5 deformed steel tie bars at least 30 inches long and spaced a maximum of 3 feet on center. Where traffic patterns could result in loading in both transverse and longitudinal directions, longitudinal tie bars should be replaced with dowel bars, so that panels are doweled on all four sides.

The recommended pavement sections are based on the assumption that a regular maintenance program will be used, which includes periodic sealing of joints and cracks, and occasional repair or replacement of isolated damaged areas.

7.11. Site Drainage

The following sections provide information on temporary drainage and stormwater considerations.

7.11.1. Temporary Drainage

Perched groundwater could be encountered on top of basalt. Site excavations should be provided with appropriate ditches and sumps to keep the exposed areas as dry as possible during construction.

7.11.2. Stormwater Considerations

We recommend that all surfaces be sloped to drain away from proposed structures. Pavement surfaces and open spaces should be sloped such that surface runoff is collected and routed to suitable discharge points. Roof drains should be tight lined to suitable discharge points located at least 15 feet from building perimeters.

Based on the results of our site exploration, laboratory testing and engineering analyses, it is our opinion that most of the site is not suitable for infiltration of post-development stormwater due to the presence of shallow basalt rock underlying much of the site. We understand most of the post-development stormwater will be conveyed off-site to the south, onto the North Bank area of Riverfront Park. A small amount of post-development stormwater infiltration is proposed within the northwest portion of the site. As indicated previously, there is an existing topographic depression within this area that will be filled in during construction. Additionally, based on the recent and historic explorations and geophysical testing, there appears to be a closed depression within the rock surface underlying this area of the site, with depth to rock at the deepest point about 30 feet below existing grade within the topographic low. A thin zone (less than about 1-foot-thick) of isolated perched groundwater was present on top of rock. This is the same area where USTs were previously removed. Results of our recent geotechnical explorations and limited environmental testing indicated soil present at the groundwater interface did not contain petroleum hydrocarbons at concentrations exceeding MTCA Method A cleanup levels for unrestricted land use. Additionally, based on information from Coffman Engineers, the contributing area and peak runoff flow rate of stormwater that infiltrates into this area of the site under current conditions during the design 10-year storm event is about twice the contributing area and peak flow rate projected for post-development conditions. Therefore, it is our opinion that the risk for potential on-site and downgradient impacts from the proposed infiltration within the northwest portion of the site is low, provided stormwater infiltration does not exceed existing conditions.

We recommend that stormwater infiltration facilities extend through on-site fill, either in its existing location or where reused as structural fill and be hydraulically connected to natural sand and gravel deposits underlying the site. Flexibility in the construction of infiltration facilities should be included in the design and specifications in the event zones of lower permeability soil are encountered during installation. Options include hydraulically connecting the infiltration facility to natural sand and gravel by excavating through fill or a lower permeability zone until the target soil is encountered and extending barrel sections or backfilling with washed drain rock to re-establish planned infiltration facility subgrade or relocating planned infiltration facilities to areas where target soils are present.

Additionally, results of previous sampling and testing indicate portions of the on-site fill contain metal and PAH contaminants. Therefore, infiltration facilities should be designed and constructed to reduce the potential contact between infiltrated stormwater and possibly contaminated fill soil. This can be accomplished by:

- Designing final site grades such that swale bottoms are located within natural sand and gravel soils and/or excavating fill soil from below bio-infiltration swales to expose natural soil deposits and replacing with free-draining imported soil. We further recommend that existing fill soil be removed laterally a distance of at least 5 feet from the sides of swales, unless swales are lined as described below.
- Lining the swales with a low-permeability geomembrane liner. This will require placing a suitably thick treatment and storage layer of soil on top of the liner to comply with the *Spokane Regional Stormwater Manual*, and installation of an underdrain tight-lined to a drywell.
- Constructing drywells such that the active barrel section is located entirely within natural sand and gravel deposits. Portions of drywells that extend through existing site fill should only consist of non-perforated barrel sections.

We recommend that a GeoEngineers' representative be on-site during infiltration facility installation to observe excavations to confirm that appropriate target soil units are exposed, or alternatively, provide guidance for modifications to the systems if unsuitable soil is encountered. Additionally, we recommend full-scale testing be conducted on installed infiltration facilities promptly upon completion, but before final grading and paving is complete to confirm compliance of the system to design requirements. If results of testing indicate modifications are required, such as installation of additional drywells, those modifications can be made more expediently before final site work is complete.

7.11.2.1. Swales

We recommend an infiltration rate of 0.3 inch per hour (in/hr) for swale design. This recommendation applies to infiltration through swale bottoms and considers the potential for degradation in swale efficiency caused by siltation and vegetative growth and assumes that imported topsoil material likely will be used to support vegetative growth within bio-infiltration swales. Alternative infiltration rates may be used if a topsoil material is specified which, based on previous infiltration testing, exhibits a different infiltration rate. In this case GeoEngineers should be consulted to evaluate infiltration rates of underlying natural soil deposits.

Topsoil used within bio-infiltration swales should contain sufficient organic matter content or cation exchange capacity (CEC) to provide suitable treatment of stormwater runoff as required in the *Spokane Regional Stormwater Manual*.

7.11.2.2. Drywells

Drywells should be situated at least 30 feet from the proposed building. Drywells also should be spaced at least 30 feet apart. We estimated the outflow capacity of City of Spokane Type 1 (single-depth) drywells and Type 2 (double-depth) drywells using procedures outlined in the *Spokane Regional Stormwater Manual*. Based on the results of our field infiltration testing and laboratory grain-size analyses, we recommend using a design outflow rate of 0.25 cubic feet per second (cfs) for Type 1 drywells and 0.43 cfs for Type 2 drywells. Both rates include safety factors as recommended in the *Spokane Regional Stormwater Manual*. Results of our analyses are presented in Table 8.

TABLE 8. SPOKANE 200 METHOD SUMMARY

Boring No.	Approximate Depth (ft)	Approximate Elevation (ft)	Soil Type	Percent Fines	Spokane 200 Method Hydraulic Conductivity K (cm/sec)	Normalized Exfiltration Rate (cfs/ft)	Safety Factor	Single-Depth Drywell Allowable Exfiltration Rate (cfs)	Double-Depth Drywell Allowable Exfiltration Rate (cfs)
B-8	7	1,886	GP	5	3.1×10^{-2}	0.08	1.3	0.37	0.62
B-8	9	1,884	GP-GM	7.7	1.4×10^{-2}	0.04	2.0	0.12	0.20
B-8	14	1,879	GP	5	3.1×10^{-2}	0.08	1.3	0.37	0.62
Geometric Mean								**0.25**	**0.43**

Notes:

cm/sec = centimeters per second; cfs = cubic feet per second; ft = foot

8.0 DESIGN REVIEW AND CONSTRUCTION SERVICES

The recommendations in this report are based on the previously stated assumptions and design information provided to us. We welcome the opportunity to discuss construction plans and specifications for this project as they are being developed. We believe GeoEngineers should be retained to review the geotechnical-related portions of the plans and specifications to evaluate whether they are in conformance with the recommendations provided in this report. Through our service to you on this project, we understand your project goals, objectives and preferences; the various assumptions that may have been made; and the many technical interrelationships involved. Consequently, we are more likely to recognize a problem for what it is, and to recommend the most effective solution.

GeoEngineers also maintains an accredited soil and material testing laboratory which allows us to provide special inspection and testing services in general accordance with the IBC and local building department requirements. Our services include inspection and/or testing of subgrade soil and structural fill placement and compaction.

9.0 LIMITATIONS

We have prepared this report for the PFD Sportsplex project in Spokane, Washington. The PFD may distribute copies of this report to their designated design and construction team members and their authorized agents and regulatory agencies as may be required for the project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering and environmental science practices in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

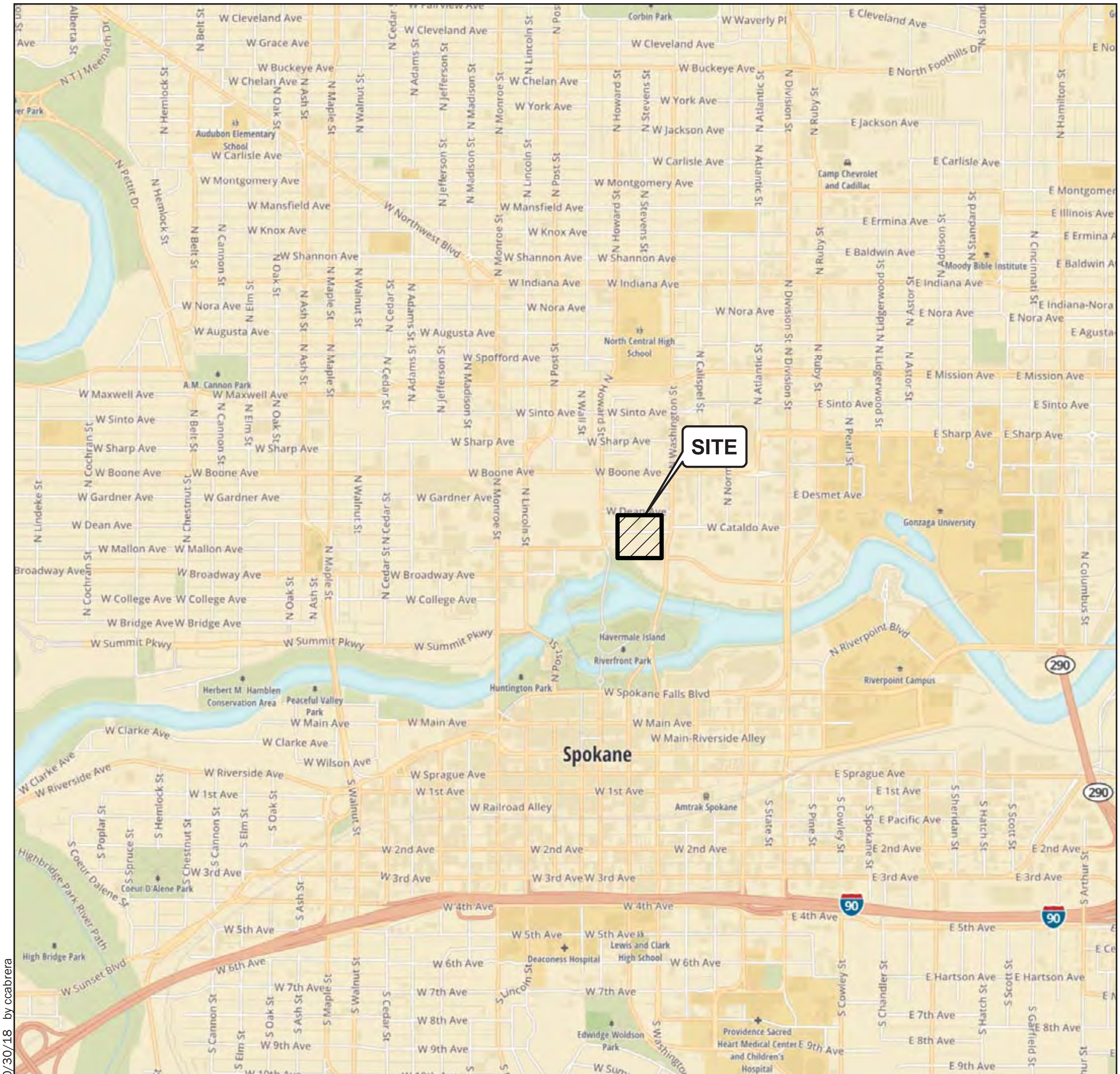
Please refer to Appendix E, titled “Report Limitations and Guidelines for Use,” for additional information pertaining to use of this report.

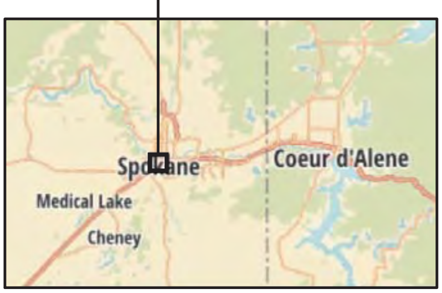
10.0 REFERENCES

CH2MHill, Inc. 1999a. “Phase II Environmental Site Assessment, Limited Subsurface Exploration “Howard Street Property.” Prepared for City of Spokane.

CH2MHill, Inc. 1999b. “Technical Memorandum, Focused Subsurface Investigation Report of Findings “Howard Street Property.” Prepared for City of Spokane Department of Parks and Recreation.

GeoEngineers, Inc. 2019. “Revised Preliminary Geotechnical Engineering Evaluation, Proposed Sportsplex, Spokane, Washington.” Prepared for the Spokane Public Facilities District.





N
W
E
S

2,000 0 2,000

Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2018

Projection: NAD 1983 UTM Zone 11N

Vicinity Map

Spokane Sportsplex Facility
Spokane, Washington

GEOENGINEERS

Figure 1

P:\12\12088006\GIS\MXD\1208800601_F01_VicinityMap.mxd Date Exported: 10/30/18 by ccabrera

P:\12\12088006\GIS\MXD\1208800603_F02_SitePlan_Overlay.mxd Date Exported: 02/25/19 by ccabrera

Legend

B-1	Approximate Boring Location (GeoEngineers, October 2018)
TP-1	Approximate Test Pit Location (CH2MHill, March 1999)
TP-1	Approximate Test Pit Location (CH2MHill, August 1999)
B-1	Approximate Boring Location (Anania, 1990)
MW-1	Approximate Monitoring Well Location (Anania, 1990)
SB-1	Approximate Boring Location (CH2MHill, August 1999)
	Basalt Outcrop
	Parcels
	Approximate Location of Proposed Sportsplex Building
(1)	Estimated Depth to Rock (ft)
	Major Contour (5 Foot)
	Minor Contour (1 Foot)

N W E S

100 0 100

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from ESRI, Parcels from Spokane County, Borings from CH2MHilll and Anania site plans

Projection: WGS 1984 Web Mercator

Site Plan

Spokane Sportsplex Facility
Spokane, Washington

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Figure 2

APPENDICES

GeoEngineers

APPENDIX A
Field Methods, Boring Logs and Geotechnical Laboratory Testing

APPENDIX A
FIELD METHODS, BORING LOGS AND GEOTECHNICAL LABORATORY TESTING

General

We explored soil, rock and groundwater conditions at the site on October 25 and 26, 2018 by drilling 16 borings (B-1 through B-16) at the approximate locations shown on Figure 2. The borings were advanced using a truck-mounted CME 75 hollow-stem auger drill rig owned and operated by GeoEngineers. Following auger refusal, boring B-11 was advanced approximately 5 additional feet using NQ wireline rock coring methods.

General Soil Sampling Procedures

Soil samples were obtained from the borings at approximate 2½- to 5-foot-depth intervals using either a 2-inch, outside-diameter split-spoon sampler or a 2.4-inch, inside-diameter California-style sampler. The sampler was driven into the ground using a 140-pound hammer, falling 30 inches on each blow. The number of blows required to drive the sampler each of three, 6-inch increments of penetration were recorded in the field. The sum of the blow counts for the last two, 6-inch increments of penetration is reported on the boring logs, unless otherwise indicated. The blow counts for the 2-inch, outside-diameter split-spoon sampler are reported as the standard penetration test (SPT) N-value, unless otherwise noted. The approximate N-values for the large-diameter sampler also are reported on the boring logs under the "Remarks" section. The conversion of California-style sampler penetration resistant to approximate SPT N-values was made using the Lacroix-Horn equation (ASTM SPT-523, 1973). Sampling equipment was decontaminated between each sampling event using a combination of Liquinox and distilled water.

Rock samples were obtained from the core barrel of the CME 75 drill rig using an NQ wire-line coring system. Percent recovery and Rock Quality Designation (RQD) were measured in the field during rock coring. RQD is a qualitative measure of the competency of rock and is determined by summing the length of recovered core greater than 4 inches in each core run, dividing by the length of the core run, and multiplying by 100.

Soil and rock samples collected from the borings were returned to our laboratory for review.

The explorations were continuously monitored by an engineer from GeoEngineers who classified the soil and rock encountered, maintained detailed logs of the borings showing stratigraphic changes and other pertinent information, obtained representative soil and rock samples, and observed groundwater conditions. Soil encountered in the borings was classified in the field in general accordance with ASTM D 2488, the Standard Practice for the Classification of Soils (Visual-Manual Procedure), which is described in Figure A-1, Key to Exploration Logs. Rock encountered in the borings was classified based on the descriptions in Figure A-2, Rock Classification System. Logs of the borings are presented in Figures A-3 through A-18, Logs of Borings. The logs are based on interpretation of the field and laboratory data and indicate the depth at which subsurface materials or their characteristics change, although these changes might actually be gradual. A photograph of rock core obtained from boring B-11 also is presented in Figure A-19, Rock Core Photo. Sieve analysis results are presented on Figure A-20, Sieve Analysis Results.

Exploration locations were established in the field using a hand-held iPad® device with GISPro® software. The published accuracy for the software is approximately 16.4 feet, although the actual measured locations could be more accurate than the published accuracy. Elevations at boring locations was estimated based on interpolation of boring locations to elevation contours shown in Figure 2. The locations and elevations shown on the boring logs should be considered accurate to the degree implied by the method used.

Field Screening of Soil Samples

A GeoEngineers' representative performed field screening of soil samples obtained during drilling activities. Field screening results are used as a general guideline to delineate depths with possible petroleum-related contamination. The screening methods used include: (1) visual screening; (2) water sheen screening; and (3) headspace vapor screening using a MiniRae photoionization detector (PID) calibrated to isobutylene.

Visual screening consists of inspecting the soil for stains indicative of contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high.

Water sheen screening is a more sensitive method that has been effective in evaluating whether hydrocarbon concentrations are less than regulatory cleanup guidelines. Water sheen screening involves placing soil in water and observing the water surface for signs of sheen. Sheen screening might detect both volatile and nonvolatile petroleum hydrocarbons. Sheen classifications are as follows:

No Sheen	No visible sheen on water surface.
Slight Sheen	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly. Natural organic matter in the soil might produce a slight sheen.
Moderate Sheen	Light to heavy sheen; might have some color/iridescence; spread is irregular to flowing, might be rapid; few remaining areas of no sheen on water surface.
Heavy Sheen	Heavy sheen with color/iridescence; spread is rapid; entire water surface might be covered with sheen.

Headspace vapor screening involved placing a soil sample in a plastic sample bag. Air was captured in the bag, and the bag was shaken to expose the soil to the air trapped in the bag. The probe of the PID was then inserted into the bag to measure volatile organic compounds (VOCs) in the air within the bag. In this application, the PID measured concentration of organic vapors ionizable by a 10.6 electron volt (eV) lamp in the range between 1.0 and 2,000 parts per million (ppm), with a resolution of +/- 2 ppm.

Field screening results are site-specific. The effectiveness of field screening results will vary with temperature, moisture content, organic content, soil type and type and age of contaminant. The presence or absence of a sheen or headspace vapors does not necessarily indicate the presence or absence of petroleum hydrocarbons.

Results of the field screening are shown on the boring logs as the respective screening depths. Results of the field screening did not indicate the presence of petroleum contamination.

Handling of Investigation-Derived Waste

Auger cuttings were minimal, and therefore drumming and storage of drill cuttings were not required.

Disposable items, such as gloves, paper towels, etc., were placed in plastic bags after use and deposited in trash receptacles for disposal.

Geotechnical Laboratory Testing

Soil samples obtained from the explorations were returned to our laboratory for further examination and testing. Representative soil samples were selected for laboratory tests to evaluate geotechnical engineering characteristics of the site soil and to confirm or revise our field classification. The laboratory testing program was completed in general accordance with applicable ASTM standards and is summarized in Table A-1, Summary of Laboratory Testing.

TABLE A-1. SUMMARY OF LABORATORY TESTING

Standard Test Method for:	Test Method Designation	Total Tests Performed	Results Location
Laboratory grain-size analysis	ASTM C 136	4	Presented in Figure A-20.
Minus 200 Washes	ASTM D 1140	2	Presented on boring log at respective sample depths.
Point Load Index Testing of Rock Core	ASTM D 5731	2	Presented on boring log at respective sample depths.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab
- Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

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Figure A-1

UNIFIED ROCK CLASSIFICATION SYSTEM (URCS)*

BASIC ELEMENTS

DEGREE OF WEATHERING

WEATHERED		ALTERED	REPRESENTATIVE	
SAND SIZE COMPLETELY DECOMPOSED STATE (CDS)	GRAVEL SIZE PARTLY DECOMPOSED STATE (PDS)	STAINED STATE (STS)	VISUALLY FRESH STATE (VFS)	MICRO FRESH STATE (HAND LENSE) (MFS)
E	D	C	B	A
PLASTIC NON-PLASTIC	PLASTIC NON-PLASTIC	COMPARE TO FRESH STATE	UNIT WEIGHT, RELATIVE ABSORPTION	

ESTIMATED STRENGTH

REMOLDING		REACTION TO IMPACT OF 1 LB. BALLPEEN HAMMER		
"MOLDABLE" (FRIABLE) (MBL)	"CRATERS" (SHEARS) (CQ)	"DENTS" (COMPRESSIVE) (DQ)	"PITS" (TENSIONAL) (PQ)	"REBOUNDS" (ELASTIC) (RQ)
E	D	C	B	A
<1,000 PSI (<7 Mpa)	1,000 TO 3,000 PSI (7 TO 21 Mpa)	3,000 TO 8,000 PSI (21 TO 55 Mpa)	8,000 TO 15,000 PSI (55 TO 103 Mpa)	>15,000 PSI (>103 Mpa)

DISCONTINUITIES

TRANSMITS WATER						
YES	NO	YES	NO	LATENT PLANES OF SEPARATION (LPS)	SOLID-PREFERRED BREAKAGE (SPB)	SOLID-RANDOM BREAKAGE (SRB)
3-DIMENSIONAL PLANES OF SEPARATION (3D)		2-DIMENSIONAL PLANES OF SEPARATION (2D)				
E		D		C	B	A
INTERLOCK		ATTITUDE				

UNIT WEIGHT

LESS THAN 130 LBS/CU FT (2.10 Mg/CU M) (<130)	130 TO 140 LBS/CU FT (2.10 TO 2.25 Mg/CU M) (130)	140 TO 150 LBS/CU FT (2.25 TO 2.40 Mg/CU M) (140)	150 TO 160 LBS/CU FT (2.40 TO 2.55 Mg/CU M) (150)	GREATER THAN 160 LBS/CU FT (2.55 Mg/CU M) (>160)
E	D	C	B	A

DESIGN NOTATION

WEATHERING	STRENGTH	DISCONTINUITY	WEIGHT
A-E	A-E	A-E	A-E

*Williamson, Douglas A., 1984, Unified Rock Classification System: Association of Engineering Geologists Bulletin, Vol. XXI, No. 3, pp. 345-354

ROCK CLASSIFICATION SYSTEM

GEOENGINEERS

Figure A-2

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 3.25	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) 1905 / Vertical Datum NAVD88	Hammer Data Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment Truck-mounted CME-75
Easting (X) 2481208 / Northing (Y) 261425	System Datum WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration
Notes:		

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							CR	Approximately 4 inches of fine to coarse gravel with silt and sand (dense, moist) (crushed gravel surfacing)			
								GP-GM	Dark gray fine to coarse gravel with silt, sand and cobbles (dense to very dense, moist) (fill?)			
			14	133		1 / SA				NS	<1	Approximate SPT N Value = 50+ MC = 2% %F = 7.5
			3	50/4"		2						
								GP/BSLT	Dark gray fine to coarse gravel with sand and cobbles (medium dense, moist) (fractured basalt)			Boring terminated at approximately 3¼ feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-1 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-3
Sheet 1 of 1

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 3	Logged By JJB, Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1905 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481325 / 261440	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							CR	Approximately 5 inches of gray fine to coarse gravel with silt and sand (medium dense to dense, moist) (crushed gravel surfacing)			
								GP-GM	Dark gray fine to coarse gravel with silt, sand and cobbles (dense to very dense, moist) (fill?)			
			12	216		1				SS	1.7	Approximate SPT N Value = 50+
								GP/BSLT	Dark gray fine to coarse gravel with sand, cobbles and boulders (very dense, moist) (fractured basalt)			Boring terminated at approximately 3 feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-2 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 3.75	Logged By JJB Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	1905 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) Northing (Y)	2481406 261439	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							CR	Approximately 6 inches of brown fine to coarse gravel with silt and sand (medium dense to dense, moist) (crushed gravel surfacing)			
								GP-GM	Brown fine to coarse gravel with silt and sand (dense, moist) (fill?)			
			10	147		1A & 1B				NS	<1	Approximate SPT N Value = 50+
								GP/BSLT	Dark gray fine to coarse gravel with sand, cobbles and trace silt (very dense, moist) (fractured basalt)			
			6	100/8"		2				NS	<1	
												Boring terminated at approximately 3¾ feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-3 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-5
Sheet 1 of 1

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 6.5	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) 1905 / Vertical Datum NAVD88	Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment: Truck-mounted CME-75
Easting (X) 2481157 / Northing (Y) 261462	System Datum: WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							CR	Approximately 7 inches of gray and brown fine to coarse gravel with silt and sand (dense, moist) (crushed gravel surfacing)			
								GP-GM	Brown fine to coarse gravel with silt, sand, cobbles and occasional boulders (medium dense to very dense, moist) (fill)			
			8	170/11"		1				SS	<1	Approximate SPT N Value = 50+
			0	51		2						Approximate SPT N Value = 21
1900	5											
			0	18/5"		3						Boring terminated at approximately 6½ feet because of auger refusal on apparent basalt Two previous attempts refused at approximately 1 and 5 feet depth in cobble and boulders

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

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Log of Boring B-4 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 4.25	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum: 1903.5 / NAVD88	Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment: Truck-mounted CME-75	
Easting (X) / Northing (Y): 2481411 / 261593	System Datum: WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	
Notes:			

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							AC	Approximately 4½ inches of asphalt concrete pavement			
								GM	Dark brown silty fine to coarse gravel with sand, cobbles and occasional boulders (medium dense to dense, moist) (fill?)			
			10	144/12"		1				NS	<1	Approximate SPT N Value = 50+ Sampler on apparent cobble or boulder. Blow count overstated.
1900			8	210/8"		2		GP-GM/ BSLT	Dark gray fine to coarse gravel with silt, sand, cobbles and boulders (medium dense to very dense, moist) (fractured basalt)	NS	<1	Approximate SPT N Value = 50+ Boring terminated at approximately 4¼ feet because of auger refusal in apparent boulder. Previous attempt refused at approximately 2 feet in apparent boulder

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-5 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-7
Sheet 1 of 1

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 3.75	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1905 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481502 / 261445	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							GP-GM	Brown fine to coarse gravel with silt, sand, cobbles and occasional boulders (loose, moist) (fill?)			
			6			1				NS	<1	
			0	75/4"		2						Approximate SPT N value = 50+
								GP-GM/ BSLT	Dark gray fine to coarse gravel with silt, sand, cobbles and boulders (very dense, moist) (fractured basalt)			Boring terminated at approximately 3¾ feet because of auger refusal in apparent basalt. Previous attempt approximately 4½ feet east refused at approximately 3 feet in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-6 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 2	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1905 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481586 / 261461	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		6			1 / SA		GW-GM	Brown fine to coarse gravel with silt, sand and occasional cobbles (loose, moist) (fill)			MC = 2% %F = 7
								GP/BSLT	Gray coarse gravel and cobbles with occasional sand (very dense, dry) (fractured basalt)			Boring terminated at approximately 2 feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-7 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-9
Sheet 1 of 1

Drilled	Start 10/25/2018	End 10/25/2018	Total Depth (ft) 29	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1893.5 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481304 / 261758	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							WD	Approximately ½ inch of wood chips			
								CR	Approximately 6 inches of gray fine to coarse sand with gravel and silt (medium dense, moist) (crushed gravel surfacing)			
								SM	Dark brown to brown silty fine to coarse sand with gravel and occasional cobbles (loose, moist) (fill)			
			12	20		1				NS	<1	Approximate SPT N Value = 8
1890			14	19		2				NS	<1	Approximate SPT N Value = 8
	5											
			16	43		3 SA		GW	Brown fine to coarse gravel with sand, trace silt and occasional cobbles (medium dense, moist)	NS	<1	Approximate SPT N Value = 18 MC = 4 %F = 5
1885			14	47		4 %F		GP-GM	Brown fine to coarse gravel with silt, sand and occasional cobbles (loose to medium dense, moist)	NS	<1	Approximate SPT N Value = 19 MC = 3 %F = 7
	10											

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-8 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	10											
								GP	Brown fine to coarse gravel with sand, occasional cobbles and trace silt (loose to medium dense, moist)			
1880			12	57		5 / %F				NS	<1	Approximate SPT N Value = 23 MC = 3 %F = 5
	15											
1875			6	17		6				NS	<1	Approximate SPT N Value = 7
	20											

Log of Boring B-8 (Revised February 2019) (continued)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
1870												
	25		12	54		7				NS	<1	Approximate SPT N Value = 22
									Becomes wet			Groundwater observed at 27.6 feet bgs
1865			5	50/5"		8				SS	28.2	Approximate SPT N Value = 50+ slight petroleum odor Boring terminated at approximately 29 feet because of auger refusal on apparent basalt

Drilled Start 10/26/2018 End 10/26/2018	Total Depth (ft) 8.75	Logged By JJB Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 1902 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Truck-mounted CME-75
Easting (X) 2481342 Northing (Y) 261623		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0				CR	Approximately 2 inches of gray fine to coarse gravel with silt and sand (dense, moist) (gravel surfacing)			
					GM	Brown silty fine to coarse gravel with sand and occasional debris (brick, rubber) (medium dense, moist) (fill)			
		16	14	1	SM	Dark brown silty fine to medium sand with gravel and occasional debris (glass and metal fragments) (loose to medium dense, moist) (fill)	NS	<1	Approximate SPT N Value = 6
1900									
		8	54	2			NS	<1	Approximate SPT N Value = 22
	5								
		10	124	3A & 3B			NS	<1	Approximate SPT N Value = 50+ Sampler on apparent cobble. Blow count likely overstated.
					SM	Brown silty fine to medium sand with gravel and occasional cobbles (medium dense, moist)			
1895									
		8	66/8"	4 SA			NS	<1	MC = 19 %F = 41 Approximate SPT N Value = 50+ Boring terminated at approximately 8½ feet because of auger refusal on apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-9 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-11
Sheet 1 of 1

Drilled	Start 10/26/2018	End 10/26/2018	Total Depth (ft) 1.25	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1905 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481581 / 261620	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							AC	Approximately 2½ inches of asphalt concrete pavement			
								CR	Approximately 2 inches of gray fine to coarse gravel with silt and sand (medium dense, moist) (base course)			
			4	100/6"		1		GM	Brown silty fine to coarse gravel with sand (medium dense, moist) (fill?)	NS	0.8	Approximate SPT N Value = 50+
								GP/BSLT	Gray fine to coarse gravel with sand and cobbles (very dense, moist) (fractured basalt)			Boring terminated at approximately 1¼ feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-10 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-12
Sheet 1 of 1

Drilled	Start 10/26/2018	End 10/26/2018	Total Depth (ft) 7.5	Logged By JJB	Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1901 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481764 / 261651	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							AC	Approximately 2 inches of asphalt concrete pavement			
								CR	Approximately 1½ inches of gray fine to coarse gravel with sand and trace silt (medium dense, moist) (base course)			
								GM	Brown silty fine to coarse gravel with sand and cobbles (medium dense, moist) (fill?)			
1900			2.5	120/5.5"		1		GP/BSLT	Dark gray fine to coarse gravel with sand, cobbles and trace silt (very dense, moist) (fractured basalt)	NS	1.2	Approximate SPT N value = 50+
								BSLT	Basalt; gray, fine-grained, partly decomposed, rebound quality, 3-dimensional planes of separation, 167 pcf (DAEA)			Boring terminated at approximately 2½ feet because of auger refusal in basalt. Switch to wireline rock coring.
	5							BSLT	Basalt; gray, fine-grained, stained state, rebound quality, 2-dimensional planes of separation, 170 pcf (CADA)			Point Load Index Text, estimated uniaxial compressive strength = 42,600 psi
1895												Point Load Index Text, estimated uniaxial compressive strength = 37,000 psi

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-11 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Drilled — Start: 10/26/2018 — End: 10/26/2018	Total Depth (ft): 2	Logged By: JJB Checked By: DRL	Driller: GeoEngineers, Inc.	Drilling Method: Hollow-stem Auger
Surface Elevation (ft): 1905 Vertical Datum: NAVD88		Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment: Truck-mounted CME-75
Easting (X): 2481571 Northing (Y): 261697		System Datum: WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							AC	Approximately 2 inches of asphalt concrete pavement			
								CR	Approximately 2 inches of gray fine to coarse gravel with silt and sand (medium dense, moist) (base coarse)			
			8	134/11"		1		GP-GM/ BSLT	Dark gray fine to coarse gravel with silt, sand, cobbles and boulders (very dense, moist) (fractured basalt)	NS	<1	Approximate SPT N Value = 50+
												Boring terminated at approximately 2 feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-12 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-14
Sheet 1 of 1

Drilled	Start 10/26/2018	End 10/26/2018	Total Depth (ft) 2.25	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1904.5 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481238 / 261497	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							CR	Approximately 5 inches of gray fine to coarse gravel with silt and sand (medium dense, moist) (gravel surfacing)			
								GP-GM	Gray-brown fine to coarse gravel with silt, sand and cobbles (medium dense, moist) (fill)			
			10	161/9"		1				NS	<1	Approximate SPT N Value = 50+ Sampler on apparent cobble; blow count overstated
								GP/BSLT	Gray fine to coarse gravel with sand, cobbles and boulders (dense to very dense, moist) (fractured basalt)			Boring terminated at approximately 2¼ feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-13 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-15
Sheet 1 of 1

Drilled	Start 10/26/2018	End 10/26/2018	Total Depth (ft) 2.25	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	1904 / NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) / Northing (Y)	2481321 / 261518	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							CR	Approximately 4 inches of brown to gray fine to coarse gravel with silt and sand (medium dense, moist) (crushed gravel surfacing)			
								GM	Brown silty fine to coarse gravel with sand, cobbles and boulders (medium dense, moist) (fill?)			
			12	166/8"		1				NS	<1	Approximate SPT N Value = 50+ Sampler in cobbles and boulders; blow count overstated
								GP/BSLT	Dark gray fine to coarse gravel with sand, cobbles and boulders (dense to very dense, moist) (fractured basalt)			Boring terminated at approximately 2¼ feet because of auger refusal in basalt rock

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

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Log of Boring B-14 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Drilled	Start 10/26/2018	End 10/26/2018	Total Depth (ft) 2.5	Logged By JJB / Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) 1904.5 / Vertical Datum NAVD88	Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment: Truck-mounted CME-75
Easting (X) 2481484 / Northing (Y) 261524	System Datum: WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							GM	Brown silty fine to coarse gravel with sand and cobbles (medium dense, moist) (fill?)			
			8	102/11"		1				NS	<1	Approximate SPT N Value = 50+ Sampler in cobbles and boulders; blow count overstated
								GP/BSLT	Gray fine to coarse gravel with sand, cobbles and trace silt (very dense, moist) (fractured basalt)			
												Boring terminated at approximately 2½ feet because of auger refusal in apparent basalt rock

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-15 (Revised February 2019)

GeoEngineers

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-17
Sheet 1 of 1

Drilled	Start 10/26/2018	End 10/26/2018	Total Depth (ft)	2	Logged By JJB Checked By DRL	Driller GeoEngineers, Inc.	Drilling Method	Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	1905 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-mounted CME-75
Easting (X) Northing (Y)	2481592 261530	System Datum	WA State Plane North NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							SM	Brown silty fine to coarse sand with gravel and occasional cobbles (loose, moist) (fill)			
			5	60/5.5"		1				NS	<1	Approximate SPT N Value = 50+ Sampler on apparent cobble; blow count overstated
								GP/BSLT	Gray fine to coarse gravel and cobbles with trace silt (very dense, moist) (fractured basalt)			Boring terminated at approximately 2 feet because of auger refusal in apparent basalt

Note: See Figure A-1 for explanation of symbols; Figure A-2 for ASTM Rock Classification System.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring B-16 (Revised February 2019)

GEOENGINEERS

Project: Spokane Sportsplex Facility
Project Location: Spokane, Washington
Project Number: 12088-006-03

Figure A-18
Sheet 1 of 1

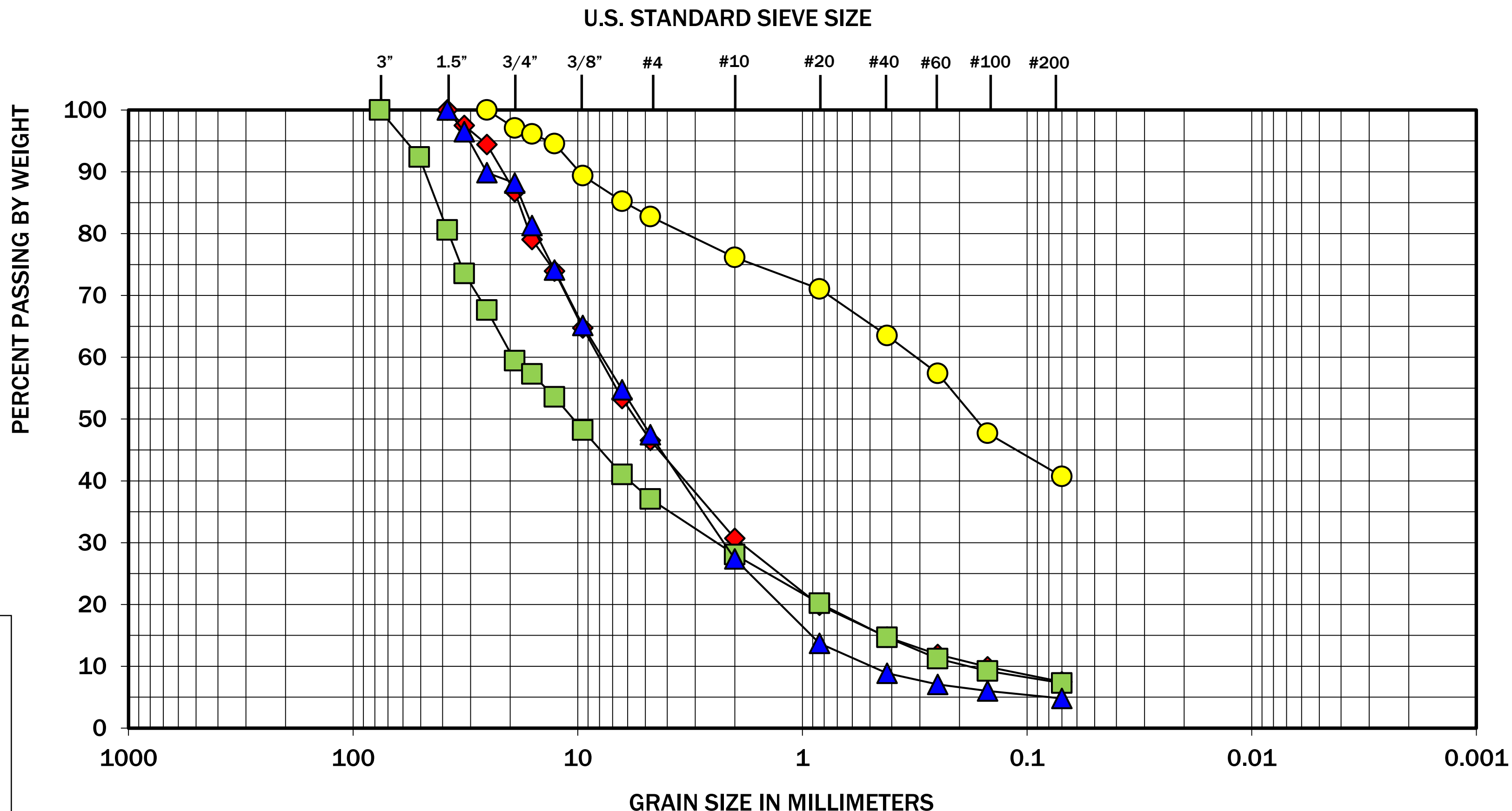
Rock Core, B-11 from 2½- to 7½-Foot Depth

Spokane Sportsplex Facility
Spokane, Washington

GEOENGINEERS

Figure A-19

22593-001-01 11/13/2018



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆ (red diamond)	B-1	1 - 2.5	2	Fine to coarse gravel with silt and sand
■ (green square)	B-7	0 – 0.2	2	Fine to coarse gravel with silt and sand
▲ (blue triangle)	B-8	6 – 7.5	4	Fine to coarse gravel with sand and trace silt
● (yellow circle)	B-9	8.5 - 10	19	Silty fine to medium sand with gravel

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.

The grain size analysis results were obtained in general accordance with ASTM D 6913.

GEOENGINEERS

Spokane Sportsplex Facility
Spokane, Washington

Sieve Analysis Results

Figure A-20

APPENDIX B
Geophysical Survey Report

November 9, 2018 GeoEngineers 2018-11-09.2

RE: SEISMIC REFRACTION SURVEY - SPOKANE SPORTSPLEX

Based on the project objective and site conditions, Sage Earth Science conducted a series of seismic P-wave refraction velocity profiles at the eastern Washington. The objective of the survey is to determine the compression wave velocity profile of the shallow subsurface (0-50 ft.) for the purpose of characterizing the site rock profile.

P-wave survey (refraction)

Given a physical setting of increasing density with depth, and by measuring the travel time of a compression wave (*p-wave*) between known points, the seismic refraction method can be used to determine the depth to a refracting horizon(s), the seismic velocity of the refracting horizon(s), as well as thickness and velocities of the overlying materials.

Figure 1 seismograph and field equipment

Approximately 2,200 feet of profile were acquired distributed across the site as shown in figure 2. The profiles were located in consultation with the customer with final locations made in the field based on site conditions. Data acquisition was performed in accordance with ASTM standard, **ASTM D 5777-00** *Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation.* Data were reduced using PlotRefra™ seismic refraction tomographic inversion software produced by Geometrics Inc.

Table 1 Test recording parameters

Test location	Spokane Sportsplex
Test Date	11/1/2018
Recording instrument	DMT Summit Extreme Pro
S/N	SUX1018
geophone natural period	4.5 Hz.
geophone/station spacing	6.56 ft. (2 meters)
number of channels	24
spread length	150 ft.
sample rate	0.25 millisecond
number of samples	2,000 per channel
record length	0.5 seconds
low pass filter	½ nyquist
low cut filter	1 Hz.
seismic source	16 pound sledgehammer
source location	Channels 1,5,10,15,20, and 24
Analysis software	PlotRefra™ Geometrics, Inc. tomographic inversion

Discussion

The following figures show the depth to the refractor mapped across the site. The refractor is assumed to be the sediment rock interface and is based on the 4,500 fps contour. Location data were obtained using mapping grade GPS with an estimated accuracy of < 1meter.

As a general guide, quoting from the ASTM standard, **ASTM D 5777-00** *Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation*

> *The seismic refraction method provides the velocity of compressional P-waves in subsurface materials. Although the P-wave velocity can be a good indicator of the type of soil or rock, it is not a unique indicator. Table 2 shows that each type of sediment or rock has a wide range of seismic velocities, and many of these ranges significantly overlap. While the seismic refraction technique measures the seismic velocity of seismic waves in earth materials, it is the interpreter who based on knowledge of the local conditions or other data, or both, must interpret the seismic refraction data and arrive at a geologically reasonable solution*
>
> *According to Mooney (8), P-wave velocities are generally greater for:*
> *1. Denser rocks than lighter rocks*
> *2. Older rocks than younger rocks*
> *3. Igneous rocks than sedimentary rocks*
> *4. Solid rocks than rocks with crack and fractures*
> *5. Unweathered rocks than weathered rocks*
> *6. Consolidated sediments than unconsolidated sediments*
> *7. Water saturated rocks/sediments than unsaturated rocks/sediments*
> *8. Wet soils than dry soils*

Glen Carpenter / principal

Figure 2. Profile location map

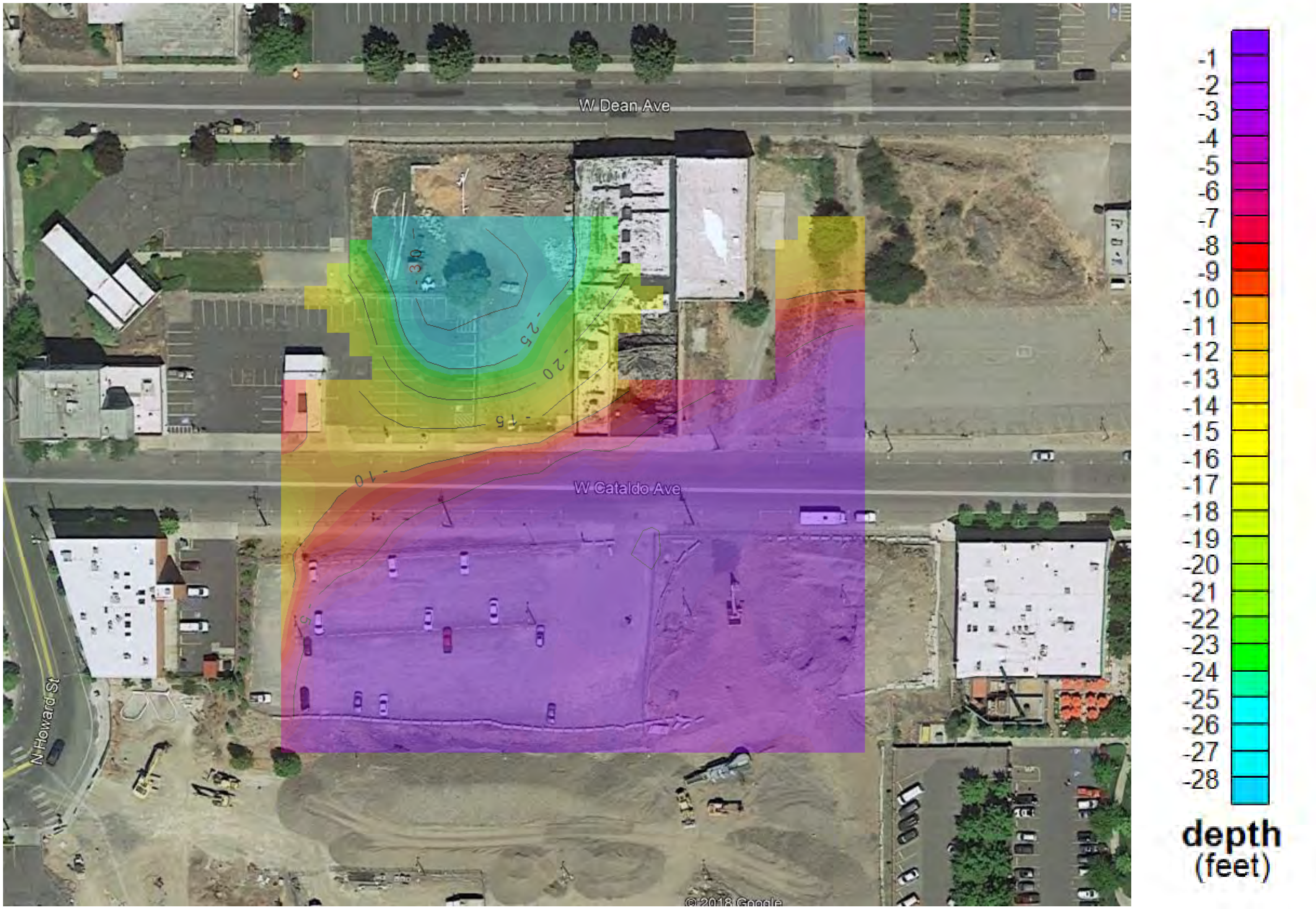


Figure 3. Rock depth map semi-transparent

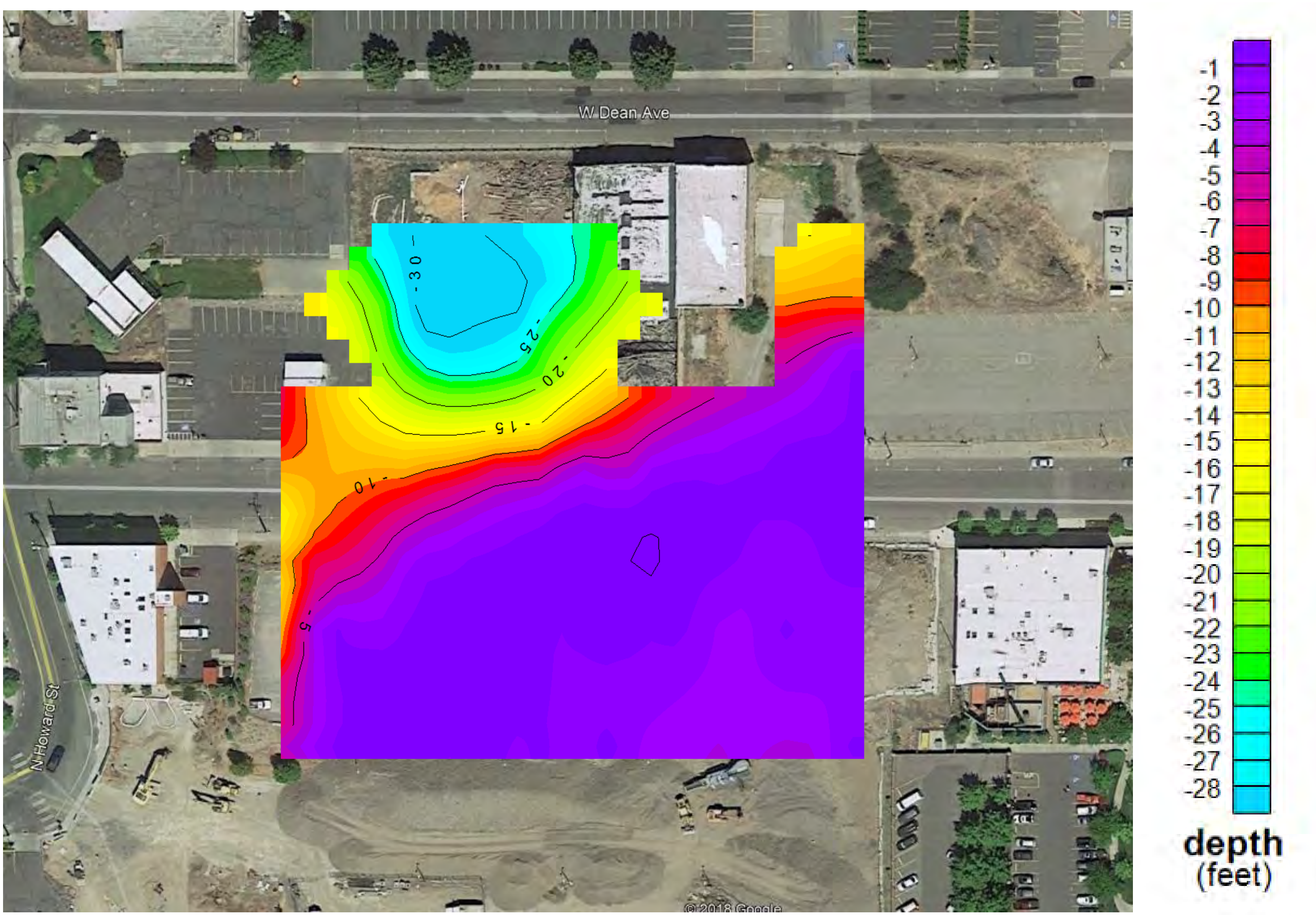
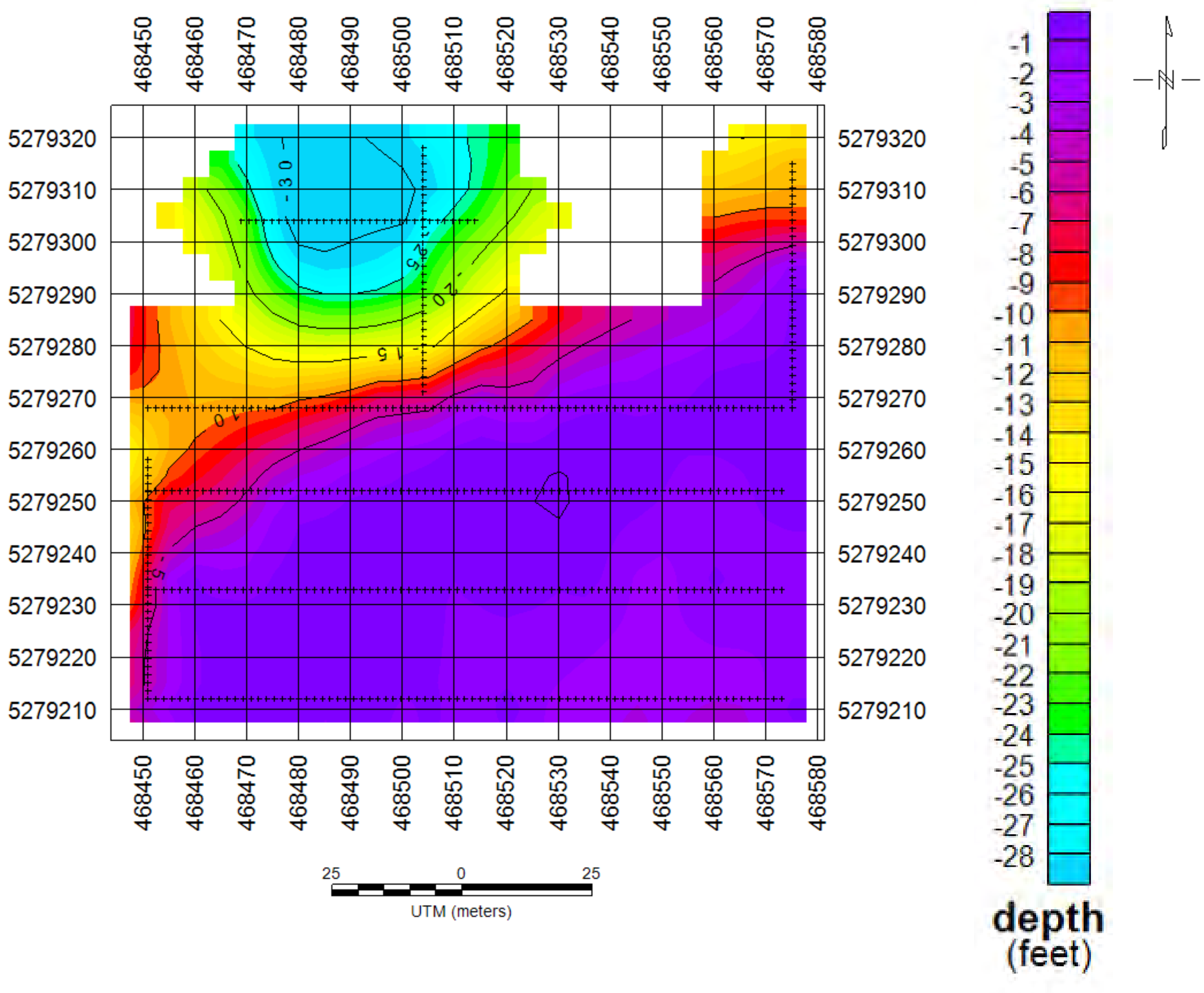


Figure 4. Rock depth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5279320
5279310
5279300
5279290
5279280
5279270
5279260
5279250
5279240
5279230
5279220
5279210
25
0
25
UTM (meters)
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
-15
-16
-17
-18
-19
-20
-21
-22
-23
-24
-25
-26
-27
-28
depth
(feet)

APPENDIX C
Chemical Analysis Laboratory Reports and Data Quality Review

GeoEngineers
523 East Second Avenue, Spokane, Washington 99202, Telephone: 509.363.3125 www.geoengineers.com

Data Validation Report

Project: Spokane Public Facilities - Spokane Sportsplex Facility
October 2018 Soil Samples

GEI File No: 12088-006-03

Date: November 28, 2018

This report documents the results of a United States Environmental Protection Agency (EPA)-defined Stage 2A data validation (EPA Document 540-R-08-005; EPA 2009) of analytical data from the analysis of soil samples collected as part of the October 2018 sampling event, and the associated laboratory quality control (QC) samples. The samples were obtained from the proposed Spokane Public Facilities District (PFD) Sportsplex site located in Spokane, Washington.

Objective and Quality Control Elements

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with the EPA Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review (EPA 2017a) and Inorganic Superfund Methods Data Review (EPA 2017b) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Laboratory Duplicates

Validated Sample Delivery Groups

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1. SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
590-9872-1	B-1 (1-2.5), B-3 (1-2.5), B-6B (0.5-1), B-8 (28.5-30, B-9 (3.5-5), B-14 (1-2.5), B-16 (1-2.5), B-4 (1-2.5)

Chemical Analysis Performed

TestAmerica Laboratories, Inc. (TestAmerica), located in Spokane, Washington, performed laboratory analyses on the samples using one or more of the following methods:

- Gasoline-range Hydrocarbons (NWTPH-Gx) by Method NWTPH-Gx;
- Petroleum Hydrocarbons (NWTPH-Dx) by Method NWTPH-Dx;
- Volatile Organic Compounds (VOCs) by Method SW8260C;
- Polycyclic Aromatic Hydrocarbons (PAHs) by Method SW8270D-SIM; and
- Total Metals by Method EPA6010C/7471B

Data Validation Summary

The results for each of the QC elements are summarized below.

Data Package Completeness

TestAmerica provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the laboratory.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between 2 and 6 degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks for the applicable methods were analyzed at the required frequency. None of the analytes of interest were detected in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the percent recovery and RPD values were within the proper control limits, with the following exception:

SDG 590-9872-1: (Total Metals) The laboratory performed an MS/MSD sample set on Sample B-1 (1-2.5). The percent recovery for total barium was less than the control limits in the MSD digested on 11/7/2018; however, the percent recovery for this target analyte was within the control limits in the corresponding MS. No action was required for this outlier.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the following exception:

SDG 590-9872-1: (Total Metals) The laboratory performed a laboratory duplicate sample set on Sample B-1 (1-2.5). The RPD for total barium was greater than the control limits in the laboratory duplicate digested on 11/7/2018. The positive result for this target analyte was qualified as estimated (J) in this sample.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS, and MS/MSD percent recovery values, with the exception noted above. Precision was acceptable, as demonstrated by the MS/MSD and laboratory duplicate RPD values, with the exception noted above.

The data are acceptable for the intended use, with the following qualification listed below in Table 2.

TABLE 2. SUMMARY OF QUALIFIED SAMPLES

Sample ID	Analyte	Qualifier	Reason
B-1 (1-2.5)	Total barium	J	Laboratory Duplicate Precision

REFERENCES

U.S. Environmental Protection Agency (EPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (EPA), 2017a. "Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review," EPA-540-R-2017-002. January 2017.

U.S. Environmental Protection Agency (EPA), 2017b. "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review," EPA-540-R-2017-001. January 2017.

Table C-1

October 2018 Soil Data[1]

Spokane Sportsplex Facility

Spokane, Washington

			Location ID	B-1		B-3		B-4		B-6B		B-8		B-9		B-14		B-16	
			Sample ID	B-1 (1-2.5)		B-3 (1-2.5)		B-4 (1-2.5)		B-6B (0.5-1)		B-8 (28.5-30		B-9 (3.5-5)		B-14 (1-2.5)		B-16 (1-2.5)	
			Sample Date	10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/26/2018		10/26/2018		10/26/2018	
			Start Depth	1		1		1		0.5		28.5		3.5		1		1	
			End Depth	2.5		2.5		2.5		1		30		5		2.5		2.5	
			Depth Unit	ft		ft		ft		ft		ft		ft		ft		ft	
Method	**Analyte**	**Units**	**MTCA Method A Clenup Level**																
NWTPH-GX[2]	Gasoline-range hydrocarbons	mg/kg	30/100	--	--	--	--	--	--	--	--	**37**		--	--	--	--	--	--
NWTPH-DX[2]	Diesel-range hydrocarbons	mg/kg	2,000	--	--	--	--	--	--	--	--	**570**		--	--	--	--	--	--
	Lube Oil-range Hydrocarbons	mg/kg	2,000	--	--	--	--	--	--	--	--	**37**		--	--	--	--	--	--
Metals[3]	Arsenic	mg/kg	20	2.3	U	**7.4**		**5.9**		**10**		**7.0**		**15**		1.1	U	**6.7**	
	Barium	mg/kg		**13**	**J**	**43**		**99**		**59**		**33**		**310**		**45**		**53**	
	Cadmium	mg/kg	2	1.8	U	0.93	U	0.93	U	0.90	U	0.74	U	**11**		0.89	U	0.95	U
	Chromium	mg/kg	2,000	2.3	U	**8.6**		**12**		**10**		**9.5**		**28**		**2.0**		**8.1**	
	Lead	mg/kg	250	5.4	U	**48**		**34**		**16**		**11**		**1,000**		**16**		**17**	
	Mercury	µg/kg	2,000	41	U	40	U	**63**		43	U	35	U	**1,400**		**100**		**33**	
	Selenium	mg/kg		9.0	U	4.6	U	4.7	U	4.5	U	3.7	U	5.1	U	4.4	U	4.8	U
	Silver	mg/kg		2.3	U	1.2	U	1.2	U	1.1	U	0.92	U	1.3	U	1.1	U	1.2	U
VOCs[4]	1,1,1,2-Tetrachloroethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,1,1-Trichloroethane	mg/kg	2	--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,1,2,2-Tetrachloroethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--

			Location ID	B-1		B-3		B-4		B-6B		B-8		B-9		B-14		B-16	
			Sample ID	B-1 (1-2.5)		B-3 (1-2.5)		B-4 (1-2.5)		B-6B (0.5-1)		B-8 (28.5-30		B-9 (3.5-5)		B-14 (1-2.5)		B-16 (1-2.5)	
			Sample Date	10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/26/2018		10/26/2018		10/26/2018	
			Start Depth	1		1		1		0.5		28.5		3.5		1		1	
			End Depth	2.5		2.5		2.5		1		30		5		2.5		2.5	
			Depth Unit	ft		ft		ft		ft		ft		ft		ft		ft	
Method	**Analyte**	**Units**	**MTCA Method A Clenup Level**																
VOCs	1,1,2-Trichloroethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,1-Dichloroethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,1-Dichloroethene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,1-Dichloropropene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2,3-Trichlorobenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2,3-Trichloropropane	mg/kg		--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--
	1,2,4-Trichlorobenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2,4-Trimethylbenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2-Dibromo-3-Chloropropane	mg/kg		--	--	--	--	--	--	--	--	0.48	U	--	--	--	--	--	--
	1,2-Dibromoethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2-Dichloroethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,2-Dichloropropane	mg/kg		--	--	--	--	--	--	--	--	0.11	U	--	--	--	--	--	--
	1,3,5-Trimethylbenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,3-Dichloropropane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	2,2-Dichloropropane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	2-Chlorotoluene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	4-Chlorotoluene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Benzene	mg/kg	0.03	--	--	--	--	--	--	--	--	0.019	U	--	--	--	--	--	--
	Bromobenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Bromochloromethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Bromodichloromethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Bromoform (Tribromomethane)	mg/kg		--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--

			Location ID	B-1		B-3		B-4		B-6B		B-8		B-9		B-14		B-16	
			Sample ID	B-1 (1-2.5)		B-3 (1-2.5)		B-4 (1-2.5)		B-6B (0.5-1)		B-8 (28.5-30		B-9 (3.5-5)		B-14 (1-2.5)		B-16 (1-2.5)	
			Sample Date	10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/26/2018		10/26/2018		10/26/2018	
			Start Depth	1		1		1		0.5		28.5		3.5		1		1	
			End Depth	2.5		2.5		2.5		1		30		5		2.5		2.5	
			Depth Unit	ft		ft		ft		ft		ft		ft		ft		ft	
Method	Analyte	Units	MTCA Method A Clenup Level																
VOCs[4]	Bromomethane	mg/kg		--	--	--	--	--	--	--	--	0.48	U	--	--	--	--	--	--
	Carbon Tetrachloride	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Chlorobenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Chloroethane	mg/kg		--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--
	Chloroform	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Chloromethane	mg/kg		--	--	--	--	--	--	--	--	0.48	U	--	--	--	--	--	--
	cis-1,2-Dichloroethene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	cis-1,3-Dichloropropene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Dibromochloromethane	mg/kg		--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--
	Dibromomethane	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Dichlorodifluoromethane (CFC-12)	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Ethylbenzene	mg/kg	6	--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Hexachlorobutadiene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Isopropylbenzene (Cumene)	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Methyl t-butyl ether	mg/kg	0.1	--	--	--	--	--	--	--	--	0.048	U	--	--	--	--	--	--
	Methylene Chloride	mg/kg	0.02	--	--	--	--	--	--	--	--	0.33	U	--	--	--	--	--	--
	Naphthalene	mg/kg		--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--
	n-Butylbenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	n-Propylbenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	p-Isopropyltoluene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Sec-Butylbenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Styrene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Tert-Butylbenzene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Tetrachloroethene	mg/kg	0.05	--	--	--	--	--	--	--	--	0.038	U	--	--	--	--	--	--
	Toluene	mg/kg	7	--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--

			Location ID	B-1		B-3		B-4		B-6B		B-8		B-9		B-14		B-16	
			Sample ID	**B-1 (1-2.5)**		**B-3 (1-2.5)**		**B-4 (1-2.5)**		**B-6B (0.5-1)**		**B-8 (28.5-30**		**B-9 (3.5-5)**		**B-14 (1-2.5)**		**B-16 (1-2.5)**	
			Sample Date	**10/25/2018**		**10/25/2018**		**10/25/2018**		**10/25/2018**		**10/25/2018**		**10/26/2018**		**10/26/2018**		**10/26/2018**	
			Start Depth	**1**		**1**		**1**		**0.5**		**28.5**		**3.5**		**1**		**1**	
			End Depth	**2.5**		**2.5**		**2.5**		**1**		**30**		**5**		**2.5**		**2.5**	
			Depth Unit	**ft**		**ft**		**ft**		**ft**		**ft**		**ft**		**ft**		**ft**	
Method	**Analyte**	**Units**	**MTCA Method A Clenup Level**																
VOCs[4]	Trans-1,2-Dichloroethene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Trans-1,3-Dichloropropene	mg/kg		--	--	--	--	--	--	--	--	0.095	U	--	--	--	--	--	--
	Trichloroethene	mg/kg	0.03	--	--	--	--	--	--	--	--	0.024	U	--	--	--	--	--	--
	Trichlorofluoromethane (CFC-11)	mg/kg		--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--
	Vinyl Chloride	mg/kg		--	--	--	--	--	--	--	--	0.057	U	--	--	--	--	--	--
	Xylene, m-,p-	mg/kg	9	--	--	--	--	--	--	--	--	0.38	U	--	--	--	--	--	--
	Xylene, o-	mg/kg	9	--	--	--	--	--	--	--	--	0.19	U	--	--	--	--	--	--
PAHs[5]	1-Methylnaphthalene	µg/kg		10	U	10	U	9.9	U	10	U	11	U	**11**		10	U	10	U
	2-Methylnaphthalene	µg/kg		10	U	10	U	9.9	U	10	U	11	U	**21**		10	U	10	U
	Acenaphthene	µg/kg		10	U	10	U	9.9	U	10	U	11	U	11	U	10	U	10	U
	Acenaphthylene	µg/kg		10	U	10	U	9.9	U	10	U	11	U	**16**		10	U	**14**	
	Anthracene	µg/kg		10	U	10	U	**11**		10	U	11	U	**25**		10	U	**21**	
	Benzo(a)anthracene	µg/kg		10	U	10	U	**140**		**24**		11	U	**59**		10	U	**77**	
	Benzo(a)pyrene	µg/kg	100	10	U	10	U	**110**		**30**		11	U	**110**		10	U	**80**	
	Benzo(b)fluoranthene	µg/kg		10	U	**12**		**150**		**34**		11	U	11	U	10	U	**95**	
	Benzo(g,h,i)perylene	µg/kg		10	U	10	U	**57**		**24**		11	U	**79**		10	U	**45**	
	Benzo(k)fluoranthene	µg/kg		10	U	10	U	**58**		**14**		11	U	11	U	10	U	**33**	
	Chrysene	µg/kg		10	U	**10**		**170**		**34**		11	U	**98**		10	U	**82**	
	Dibenzo(a,h)anthracene	µg/kg		10	U	10	U	**17**		10	U	11	U	11	U	10	U	**14**	
	Fluoranthene	µg/kg		10	U	**14**		**270**		**38**		11	U	**100**		10	U	**130**	
	Fluorene	µg/kg		10	U	10	U	9.9	U	10	U	11	U	11	U	10	U	10	U
	Indeno(1,2,3-c,d)pyrene	µg/kg		10	U	10	U	**52**		**17**		11	U	**43**		10	U	**40**	
	Naphthalene	µg/kg	5,000	10	U	10	U	9.9	U	10	U	11	U	**13**		10	U	10	U

			Location ID	B-1		B-3		B-4		B-6B		B-8		B-9		B-14		B-16	
			Sample ID	B-1 (1-2.5)		B-3 (1-2.5)		B-4 (1-2.5)		B-6B (0.5-1)		B-8 (28.5-30		B-9 (3.5-5)		B-14 (1-2.5)		B-16 (1-2.5)	
			Sample Date	10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/25/2018		10/26/2018		10/26/2018		10/26/2018	
			Start Depth	1		1		1		0.5		28.5		3.5		1		1	
			End Depth	2.5		2.5		2.5		1		30		5		2.5		2.5	
			Depth Unit	ft		ft		ft		ft		ft		ft		ft		ft	
Method	**Analyte**	**Units**	**MTCA Method A Clenup Level**																
PAHs[5]	Phenanthrene	µg/kg		10	U	10	U	**22**		**23**		**17**		**64**		10	U	**58**	
	Pyrene	µg/kg		10	U	**17**		**250**		**51**		**40**		**120**		10	U	**130**	
	Total cPAH TEQ (ND=0.5RL)[4]	µg/kg	100	7.55	U	**8.3**		**153.4**		**39.74**		8.305	U	**122.83**		7.55	U	**106.72**	

Notes

[1]Samples analyzed by TestAmerica Laboratories, Inc. in Spokane Valley, Washington.

[2]Petroleum-hydrocarbons analyzed using Ecology Northwest Method NWTPH-Gx and NWTPH-Dx.

[3]Metals analyzed using Environmental Protection Agency (EPA) Method 6010C and 7471B.

[4]Volatile organic compounds (VOCs) analyzed using EPA Method 8260C.

[5]Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) analyzed using EPA Method 8270DSIM.

[6]Carcinogenic PAH (cPAH) toxic equivalency (TEQ) calculated using toxicity equivalency factors (TEF) from MTCA Table 708-2, based on methodology described in MTCA Cleanup Regulation WAC 173-340-708.

mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram; U = analyte was not detected greater than the laboratory reporting limit; "--" = not analyzed.

Bold indicates analyte was detected at a concentrations greater than the reporting limit or MDL.

Shading indicates analyte was detected at a concentration greater than the applicable cleanup level.

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

TestAmerica Job ID: 590-9872-1
Client Project/Site: Spokane Public Facilities/12088-006-01

For:
GeoEngineers Inc
523 East Second Ave
Spokane, Washington 99202

Attn: Dave Lauder

Authorized for release by:
11/16/2018 4:03:41 PM

Randee Arrington, Project Manager II
(509)924-9200
randee.arrington@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Job ID: 590-9872-1

Laboratory: TestAmerica Spokane

Narrative

Receipt
The samples were received on 11/6/2018 3:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1º C.

GC/MS VOA
Method 8260C: The continuing calibration verification (CCV) associated with batch 590-19794 recovered above the upper control limit for Bromoform. The sample associated with this CCV was non-detect for the affected analyte; therefore, the data have been reported. The following samples are impacted: B-8 (28.5-30 (590-9872-5) and (CCVIS 590-19794/3).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method 6010C: The low level continuing calibration verification (CCVL) associated with batch 590-19878 recovered above the upper control limit for Selenium. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: GeoEngineers Inc
Project/Site: Spokane Public Facilities/12088-006-01

TestAmerica Job ID: 590-9872-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
590-9872-1	B-1 (1-2.5)	Solid	10/25/18 08:50	11/06/18 15:00
590-9872-2	B-3 (1-2.5)	Solid	10/25/18 09:50	11/06/18 15:00
590-9872-3	B-6B (0.5-1)	Solid	10/25/18 13:50	11/06/18 15:00
590-9872-5	B-8 (28.5-30	Solid	10/25/18 15:23	11/06/18 15:00
590-9872-6	B-9 (3.5-5)	Solid	10/26/18 08:32	11/06/18 15:00
590-9872-7	B-14 (1-2.5)	Solid	10/26/18 13:50	11/06/18 15:00
590-9872-8	B-16 (1-2.5)	Solid	10/26/18 14:40	11/06/18 15:00
590-9872-9	B-4 (1-2.5)	Solid	10/25/18 10:15	11/06/18 15:00

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
F3	Duplicate RPD exceeds the control limit
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: B-1 (1-2.5)

Lab Sample ID: 590-9872-1

Date Collected: 10/25/18 08:50
Date Received: 11/06/18 15:00
Matrix: Solid
Percent Solids: 98.0

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
2-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
1-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Acenaphthylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Acenaphthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Fluorene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Phenanthrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Benzo[a]anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Chrysene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Benzo[b]fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Benzo[k]fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Benzo[a]pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Indeno[1,2,3-cd]pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Dibenz(a,h)anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1
Benzo[g,h,i]perylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 13:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*75*		*23 - 120*	*11/08/18 10:13*	*11/08/18 13:30*	*1*
2-Fluorobiphenyl (Surr)	*75*		*38 - 123*	*11/08/18 10:13*	*11/08/18 13:30*	*1*
p-Terphenyl-d14	*89*		*68 - 136*	*11/08/18 10:13*	*11/08/18 13:30*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		2.3		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2
Barium	**13**	**F1**	2.3		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2
Cadmium	ND		1.8		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2
Chromium	ND		2.3		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2
Lead	ND		5.4		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2
Selenium	ND		9.0		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2
Silver	ND		2.3		mg/Kg	☼	11/07/18 08:59	11/07/18 15:04	2

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		41		ug/Kg	☼	11/15/18 10:38	11/16/18 14:10	1

Client Sample ID: B-3 (1-2.5)

Lab Sample ID: 590-9872-2

Date Collected: 10/25/18 09:50
Date Received: 11/06/18 15:00
Matrix: Solid
Percent Solids: 97.0

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
2-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
1-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Acenaphthylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Acenaphthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Fluorene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1

Client Sample Results

Client: GeoEngineers Inc	TestAmerica Job ID: 590-9872-1
Project/Site: Spokane Public Facilities/12088-006-01

Client Sample ID: B-3 (1-2.5) — Lab Sample ID: 590-9872-2

Date Collected: 10/25/18 09:50 — Matrix: Solid
Date Received: 11/06/18 15:00 — Percent Solids: 97.0

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenanthrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Fluoranthene	**14**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Pyrene	**17**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Benzo[a]anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Chrysene	**10**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Benzo[b]fluoranthene	**12**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Benzo[k]fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Benzo[a]pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Indeno[1,2,3-cd]pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Dibenz(a,h)anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1
Benzo[g,h,i]perylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 14:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*73*		*23 - 120*	*11/08/18 10:13*	*11/08/18 14:44*	*1*
2-Fluorobiphenyl (Surr)	*72*		*38 - 123*	*11/08/18 10:13*	*11/08/18 14:44*	*1*
p-Terphenyl-d14	*87*		*68 - 136*	*11/08/18 10:13*	*11/08/18 14:44*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.4**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1
Barium	**43**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1
Cadmium	ND		0.93		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1
Chromium	**8.6**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1
Lead	**48**		2.8		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1
Selenium	ND	^	4.6		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1
Silver	ND		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:17	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		40		ug/Kg	☼	11/15/18 10:38	11/16/18 14:12	1

Client Sample ID: B-6B (0.5-1) — Lab Sample ID: 590-9872-3

Date Collected: 10/25/18 13:50 — Matrix: Solid
Date Received: 11/06/18 15:00 — Percent Solids: 96.3

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
2-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
1-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Acenaphthylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Acenaphthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Fluorene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Phenanthrene	**23**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Fluoranthene	**38**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Pyrene	**51**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Benzo[a]anthracene	**24**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Chrysene	**34**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1

1 2 3 4 5 6 7 8 9 10 11 12

Client Sample ID: B-6B (0.5-1) | Lab Sample ID: 590-9872-3

Date Collected: 10/25/18 13:50 | **Matrix: Solid**
Date Received: 11/06/18 15:00 | **Percent Solids: 96.3**

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[b]fluoranthene	**34**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Benzo[k]fluoranthene	**14**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Benzo[a]pyrene	**30**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Indeno[1,2,3-cd]pyrene	**17**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Dibenz(a,h)anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1
Benzo[g,h,i]perylene	**24**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 15:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*77*		*23 - 120*	*11/08/18 10:13*	*11/08/18 15:09*	*1*
2-Fluorobiphenyl (Surr)	*72*		*38 - 123*	*11/08/18 10:13*	*11/08/18 15:09*	*1*
p-Terphenyl-d14	*86*		*68 - 136*	*11/08/18 10:13*	*11/08/18 15:09*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**10**		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1
Barium	**59**		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1
Cadmium	ND		0.90		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1
Chromium	**10**		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1
Lead	**16**		2.7		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1
Selenium	ND	^	4.5		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1
Silver	ND		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:20	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		43		ug/Kg	☼	11/15/18 10:38	11/16/18 14:14	1

Client Sample ID: B-8 (28.5-30 | Lab Sample ID: 590-9872-5

Date Collected: 10/25/18 15:23 | **Matrix: Solid**
Date Received: 11/06/18 15:00 | **Percent Solids: 88.6**

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,1,1-Trichloroethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,1,2,2-Tetrachloroethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,1,2-Trichloroethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,1-Dichloroethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,1-Dichloroethene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,1-Dichloropropene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2,3-Trichlorobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2,3-Trichloropropane	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2,4-Trichlorobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2,4-Trimethylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2-Dibromo-3-Chloropropane	ND		0.48		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2-Dibromoethane (EDB)	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2-Dichlorobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2-Dichloroethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,2-Dichloropropane	ND		0.11		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,3,5-Trimethylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,3-Dichlorobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1

Client Sample ID: B-8 (28.5-30 **Lab Sample ID: 590-9872-5**
Date Collected: 10/25/18 15:23 **Matrix: Solid**
Date Received: 11/06/18 15:00 **Percent Solids: 88.6**

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,3-Dichloropropane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
1,4-Dichlorobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
2,2-Dichloropropane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
2-Chlorotoluene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
4-Chlorotoluene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Benzene	ND		0.019		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Bromobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Bromochloromethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Bromodichloromethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Bromoform	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Bromomethane	ND		0.48		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Carbon tetrachloride	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Chlorobenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Chloroethane	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Chloroform	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Chloromethane	ND		0.48		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
cis-1,2-Dichloroethene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
cis-1,3-Dichloropropene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Dibromochloromethane	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Dibromomethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Dichlorodifluoromethane	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Ethylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Hexachlorobutadiene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Isopropylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
m,p-Xylene	ND		0.38		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Methyl tert-butyl ether	ND		0.048		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Methylene Chloride	ND		0.33		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Naphthalene	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
n-Butylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
N-Propylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
o-Xylene	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
p-Isopropyltoluene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
sec-Butylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Styrene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
tert-Butylbenzene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Tetrachloroethene	ND		0.038		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Toluene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
trans-1,2-Dichloroethene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
trans-1,3-Dichloropropene	ND		0.095		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Trichloroethene	ND		0.024		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Trichlorofluoromethane	ND		0.19		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1
Vinyl chloride	ND		0.057		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*75 - 120*	*11/06/18 16:39*	*11/06/18 20:14*	*1*
4-Bromofluorobenzene (Surr)	*111*		*76 - 122*	*11/06/18 16:39*	*11/06/18 20:14*	*1*
Dibromofluoromethane (Surr)	*106*		*80 - 120*	*11/06/18 16:39*	*11/06/18 20:14*	*1*
Toluene-d8 (Surr)	*104*		*80 - 120*	*11/06/18 16:39*	*11/06/18 20:14*	*1*

Client Sample ID: B-8 (28.5-30 | Lab Sample ID: 590-9872-5

Date Collected: 10/25/18 15:23 | Matrix: Solid
Date Received: 11/06/18 15:00 | Percent Solids: 88.6

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**37**		4.8		mg/Kg	☼	11/06/18 16:39	11/06/18 20:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*111*		*41.5 - 162*	*11/06/18 16:39*	*11/06/18 20:14*	*1*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
2-Methylnaphthalene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
1-Methylnaphthalene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Acenaphthylene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Acenaphthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Fluorene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Phenanthrene	**17**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Anthracene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Fluoranthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Pyrene	**40**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Benzo[a]anthracene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Chrysene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Benzo[b]fluoranthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Benzo[k]fluoranthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Benzo[a]pyrene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Indeno[1,2,3-cd]pyrene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Dibenz(a,h)anthracene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1
Benzo[g,h,i]perylene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 15:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*76*		*23 - 120*	*11/08/18 10:13*	*11/08/18 15:34*	*1*
2-Fluorobiphenyl (Surr)	*53*		*38 - 123*	*11/08/18 10:13*	*11/08/18 15:34*	*1*
p-Terphenyl-d14	*89*		*68 - 136*	*11/08/18 10:13*	*11/08/18 15:34*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	**570**		11		mg/Kg	☼	11/08/18 12:45	11/08/18 16:53	1
Residual Range Organics (RRO) (C25-C36)	**37**		27		mg/Kg	☼	11/08/18 12:45	11/08/18 16:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*129*		*50 - 150*	*11/08/18 12:45*	*11/08/18 16:53*	*1*
n-Triacontane-d62	*99*		*50 - 150*	*11/08/18 12:45*	*11/08/18 16:53*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.0**		0.92		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1
Barium	**33**		0.92		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1
Cadmium	ND		0.74		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1
Chromium	**9.5**		0.92		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1
Lead	**11**		2.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1
Selenium	ND	^	3.7		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1
Silver	ND		0.92		mg/Kg	☼	11/07/18 08:59	11/12/18 18:24	1

Client Sample ID: B-8 (28.5-30

Lab Sample ID: 590-9872-5

Date Collected: 10/25/18 15:23
Date Received: 11/06/18 15:00

Matrix: Solid
Percent Solids: 88.6

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		35		ug/Kg	☼	11/15/18 10:38	11/16/18 14:17	1

Client Sample ID: B-9 (3.5-5)

Lab Sample ID: 590-9872-6

Date Collected: 10/26/18 08:32
Date Received: 11/06/18 15:00

Matrix: Solid
Percent Solids: 88.0

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	**13**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
2-Methylnaphthalene	**21**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
1-Methylnaphthalene	**11**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Acenaphthylene	**16**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Acenaphthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Fluorene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Phenanthrene	**64**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Anthracene	**25**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Fluoranthene	**100**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Pyrene	**120**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Benzo[a]anthracene	**59**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Chrysene	**98**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Benzo[b]fluoranthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Benzo[k]fluoranthene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Benzo[a]pyrene	**110**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Indeno[1,2,3-cd]pyrene	**43**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Dibenz(a,h)anthracene	ND		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1
Benzo[g,h,i]perylene	**79**		11		ug/Kg	☼	11/08/18 10:13	11/08/18 20:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*89*		*23 - 120*	*11/08/18 10:13*	*11/08/18 20:31*	*1*
2-Fluorobiphenyl (Surr)	*85*		*38 - 123*	*11/08/18 10:13*	*11/08/18 20:31*	*1*
p-Terphenyl-d14	*96*		*68 - 136*	*11/08/18 10:13*	*11/08/18 20:31*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**15**		1.3		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1
Barium	**310**		1.3		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1
Cadmium	**11**		1.0		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1
Chromium	**28**		1.3		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1
Lead	**1000**		3.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1
Selenium	ND	^	5.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1
Silver	ND		1.3		mg/Kg	☼	11/07/18 08:59	11/12/18 18:37	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**1400**		430		ug/Kg	☼	11/15/18 10:38	11/16/18 14:46	10

Client Sample Results

Client Sample ID: B-14 (1-2.5)

Lab Sample ID: 590-9872-7

Date Collected: 10/26/18 13:50
Matrix: Solid
Date Received: 11/06/18 15:00
Percent Solids: 97.4

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
2-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
1-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Acenaphthylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Acenaphthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Fluorene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Phenanthrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Benzo[a]anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Chrysene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Benzo[b]fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Benzo[k]fluoranthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Benzo[a]pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Indeno[1,2,3-cd]pyrene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Dibenz(a,h)anthracene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1
Benzo[g,h,i]perylene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*69*		*23 - 120*	*11/08/18 10:13*	*11/08/18 16:24*	*1*
2-Fluorobiphenyl (Surr)	*67*		*38 - 123*	*11/08/18 10:13*	*11/08/18 16:24*	*1*
p-Terphenyl-d14	*87*		*68 - 136*	*11/08/18 10:13*	*11/08/18 16:24*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1
Barium	**45**		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1
Cadmium	ND		0.89		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1
Chromium	**2.0**		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1
Lead	**16**		2.7		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1
Selenium	ND	^	4.4		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1
Silver	ND		1.1		mg/Kg	☼	11/07/18 08:59	11/12/18 18:41	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**100**		35		ug/Kg	☼	11/15/18 10:38	11/16/18 14:27	1

Client Sample ID: B-16 (1-2.5)

Lab Sample ID: 590-9872-8

Date Collected: 10/26/18 14:40
Matrix: Solid
Date Received: 11/06/18 15:00
Percent Solids: 94.7

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
2-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
1-Methylnaphthalene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Acenaphthylene	**14**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Acenaphthene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Fluorene	ND		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1

Client Sample ID: B-16 (1-2.5) **Lab Sample ID: 590-9872-8**
Date Collected: 10/26/18 14:40 **Matrix: Solid**
Date Received: 11/06/18 15:00 **Percent Solids: 94.7**

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenanthrene	**58**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Anthracene	**21**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Fluoranthene	**130**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Pyrene	**130**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Benzo[a]anthracene	**77**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Chrysene	**82**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Benzo[b]fluoranthene	**95**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Benzo[k]fluoranthene	**33**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Benzo[a]pyrene	**80**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Indeno[1,2,3-cd]pyrene	**40**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Dibenz(a,h)anthracene	**14**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1
Benzo[g,h,i]perylene	**45**		10		ug/Kg	☼	11/08/18 10:13	11/08/18 16:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*74*		*23 - 120*	*11/08/18 10:13*	*11/08/18 16:49*	*1*
2-Fluorobiphenyl (Surr)	*72*		*38 - 123*	*11/08/18 10:13*	*11/08/18 16:49*	*1*
p-Terphenyl-d14	*84*		*68 - 136*	*11/08/18 10:13*	*11/08/18 16:49*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**6.7**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1
Barium	**53**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1
Cadmium	ND		0.95		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1
Chromium	**8.1**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1
Lead	**17**		2.9		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1
Selenium	ND	^	4.8		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1
Silver	ND		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:44	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**33**		33		ug/Kg	☼	11/15/18 10:38	11/16/18 14:30	1

Client Sample ID: B-4 (1-2.5) **Lab Sample ID: 590-9872-9**
Date Collected: 10/25/18 10:15 **Matrix: Solid**
Date Received: 11/06/18 15:00 **Percent Solids: 95.7**

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
2-Methylnaphthalene	ND		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
1-Methylnaphthalene	ND		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Acenaphthylene	ND		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Acenaphthene	ND		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Fluorene	ND		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Phenanthrene	**22**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Anthracene	**11**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Fluoranthene	**270**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Pyrene	**250**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Benzo[a]anthracene	**140**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Chrysene	**170**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1

Client Sample ID: B-4 (1-2.5) | **Lab Sample ID: 590-9872-9**
Date Collected: 10/25/18 10:15 | **Matrix: Solid**
Date Received: 11/06/18 15:00 | **Percent Solids: 95.7**

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[b]fluoranthene	**150**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Benzo[k]fluoranthene	**58**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Benzo[a]pyrene	**110**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Indeno[1,2,3-cd]pyrene	**52**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Dibenz(a,h)anthracene	**17**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1
Benzo[g,h,i]perylene	**57**		9.9		ug/Kg	☼	11/08/18 10:13	11/08/18 17:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*83*		*23 - 120*	*11/08/18 10:13*	*11/08/18 17:14*	*1*
2-Fluorobiphenyl (Surr)	*75*		*38 - 123*	*11/08/18 10:13*	*11/08/18 17:14*	*1*
p-Terphenyl-d14	*89*		*68 - 136*	*11/08/18 10:13*	*11/08/18 17:14*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**5.9**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1
Barium	**99**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1
Cadmium	ND		0.93		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1
Chromium	**12**		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1
Lead	**34**		2.8		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1
Selenium	ND	^	4.7		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1
Silver	ND		1.2		mg/Kg	☼	11/07/18 08:59	11/12/18 18:48	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	**63**		40		ug/Kg	☼	11/15/18 10:38	11/16/18 14:32	1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 590-19793/1-A
Matrix: Solid
Analysis Batch: 19794

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19793

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,1,1-Trichloroethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,1,2,2-Tetrachloroethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,1,2-Trichloroethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,1-Dichloroethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,1-Dichloroethene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,1-Dichloropropene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2,3-Trichlorobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2,3-Trichloropropane	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2,4-Trichlorobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2,4-Trimethylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2-Dibromo-3-Chloropropane	ND		0.50		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2-Dibromoethane (EDB)	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2-Dichlorobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2-Dichloroethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,2-Dichloropropane	ND		0.12		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,3,5-Trimethylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,3-Dichlorobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,3-Dichloropropane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
1,4-Dichlorobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
2,2-Dichloropropane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
2-Chlorotoluene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
4-Chlorotoluene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Benzene	ND		0.020		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Bromobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Bromochloromethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Bromodichloromethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Bromoform	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Bromomethane	ND		0.50		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Carbon tetrachloride	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Chlorobenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Chloroethane	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Chloroform	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Chloromethane	ND		0.50		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
cis-1,2-Dichloroethene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
cis-1,3-Dichloropropene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Dibromochloromethane	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Dibromomethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Dichlorodifluoromethane	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Ethylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Hexachlorobutadiene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Isopropylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
m,p-Xylene	ND		0.40		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Methyl tert-butyl ether	ND		0.050		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Methylene Chloride	ND		0.35		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Naphthalene	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
n-Butylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
N-Propylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 590-19793/1-A
Matrix: Solid
Analysis Batch: 19794

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19793

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Xylene	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
p-Isopropyltoluene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
sec-Butylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Styrene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
tert-Butylbenzene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Tetrachloroethene	ND		0.040		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Toluene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
trans-1,2-Dichloroethene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
trans-1,3-Dichloropropene	ND		0.10		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Trichloroethene	ND		0.025		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Trichlorofluoromethane	ND		0.20		mg/Kg		11/06/18 14:33	11/06/18 16:43	1
Vinyl chloride	ND		0.060		mg/Kg		11/06/18 14:33	11/06/18 16:43	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*75 - 120*	*11/06/18 14:33*	*11/06/18 16:43*	*1*
4-Bromofluorobenzene (Surr)	*92*		*76 - 122*	*11/06/18 14:33*	*11/06/18 16:43*	*1*
Dibromofluoromethane (Surr)	*105*		*80 - 120*	*11/06/18 14:33*	*11/06/18 16:43*	*1*
Toluene-d8 (Surr)	*100*		*80 - 120*	*11/06/18 14:33*	*11/06/18 16:43*	*1*

Lab Sample ID: LCS 590-19793/2-A
Matrix: Solid
Analysis Batch: 19794

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 19793

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1,2-Tetrachloroethane	0.500	0.524		mg/Kg		105	80 - 120
1,1,1-Trichloroethane	0.500	0.511		mg/Kg		102	74 - 138
1,1,2,2-Tetrachloroethane	0.500	0.453		mg/Kg		91	60 - 137
1,1,2-Trichloroethane	0.500	0.516		mg/Kg		103	66 - 125
1,1-Dichloroethane	0.500	0.473		mg/Kg		95	80 - 131
1,1-Dichloroethene	0.500	0.468		mg/Kg		94	73 - 135
1,1-Dichloropropene	0.500	0.505		mg/Kg		101	78 - 132
1,2,3-Trichlorobenzene	0.500	0.456		mg/Kg		91	62 - 127
1,2,3-Trichloropropane	0.500	0.419		mg/Kg		84	60 - 131
1,2,4-Trichlorobenzene	0.500	0.452		mg/Kg		90	67 - 126
1,2,4-Trimethylbenzene	0.500	0.488		mg/Kg		98	68 - 132
1,2-Dibromo-3-Chloropropane	0.500	0.463	J	mg/Kg		93	49 - 132
1,2-Dibromoethane (EDB)	0.500	0.501		mg/Kg		100	71 - 121
1,2-Dichlorobenzene	0.500	0.484		mg/Kg		97	73 - 124
1,2-Dichloroethane	0.500	0.457		mg/Kg		91	61 - 142
1,2-Dichloropropane	0.500	0.488		mg/Kg		98	58 - 129
1,3,5-Trimethylbenzene	0.500	0.474		mg/Kg		95	68 - 133
1,3-Dichlorobenzene	0.500	0.488		mg/Kg		98	80 - 122
1,3-Dichloropropane	0.500	0.458		mg/Kg		92	69 - 125
1,4-Dichlorobenzene	0.500	0.481		mg/Kg		96	72 - 125
2,2-Dichloropropane	0.500	0.477		mg/Kg		95	60 - 150
2-Chlorotoluene	0.500	0.465		mg/Kg		93	69 - 129
4-Chlorotoluene	0.500	0.454		mg/Kg		91	66 - 133
Benzene	0.500	0.481		mg/Kg		96	76 - 123

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 590-19793/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 19794 **Prep Batch: 19793**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromobenzene	0.500	0.435		mg/Kg		87	67 - 129
Bromochloromethane	0.500	0.505		mg/Kg		101	69 - 139
Bromodichloromethane	0.500	0.469		mg/Kg		94	72 - 128
Bromoform	0.500	0.559		mg/Kg		112	58 - 126
Bromomethane	0.500	0.490	J	mg/Kg		98	32 - 150
Carbon tetrachloride	0.500	0.484		mg/Kg		97	74 - 135
Chlorobenzene	0.500	0.519		mg/Kg		104	80 - 120
Chloroethane	0.500	0.452		mg/Kg		90	30 - 150
Chloroform	0.500	0.472		mg/Kg		94	73 - 130
Chloromethane	0.500	0.387	J	mg/Kg		77	46 - 146
cis-1,2-Dichloroethene	0.500	0.464		mg/Kg		93	80 - 126
cis-1,3-Dichloropropene	0.500	0.462		mg/Kg		92	70 - 126
Dibromochloromethane	0.500	0.505		mg/Kg		101	67 - 127
Dibromomethane	0.500	0.464		mg/Kg		93	67 - 129
Dichlorodifluoromethane	0.500	0.238		mg/Kg		48	28 - 150
Ethylbenzene	0.500	0.530		mg/Kg		106	77 - 121
Hexachlorobutadiene	0.500	0.521		mg/Kg		104	72 - 130
Isopropylbenzene	0.500	0.547		mg/Kg		109	78 - 131
m,p-Xylene	0.500	0.510		mg/Kg		102	78 - 124
Methyl tert-butyl ether	0.500	0.477		mg/Kg		95	67 - 130
Methylene Chloride	0.500	0.393		mg/Kg		79	20 - 150
Naphthalene	0.500	0.440		mg/Kg		88	55 - 128
n-Butylbenzene	0.500	0.475		mg/Kg		95	67 - 131
N-Propylbenzene	0.500	0.478		mg/Kg		96	67 - 131
o-Xylene	0.500	0.514		mg/Kg		103	77 - 129
p-Isopropyltoluene	0.500	0.502		mg/Kg		100	67 - 130
sec-Butylbenzene	0.500	0.478		mg/Kg		96	70 - 130
Styrene	0.500	0.543		mg/Kg		109	70 - 128
tert-Butylbenzene	0.500	0.500		mg/Kg		100	69 - 130
Tetrachloroethene	0.500	0.570		mg/Kg		114	70 - 134
Toluene	0.500	0.502		mg/Kg		100	77 - 125
trans-1,2-Dichloroethene	0.500	0.485		mg/Kg		97	73 - 133
trans-1,3-Dichloropropene	0.500	0.497		mg/Kg		99	68 - 124
Trichloroethene	0.500	0.525		mg/Kg		105	79 - 127
Trichlorofluoromethane	0.500	0.486		mg/Kg		97	53 - 150
Vinyl chloride	0.500	0.430		mg/Kg		86	38 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*97*		*75 - 120*
4-Bromofluorobenzene (Surr)	*92*		*76 - 122*
Dibromofluoromethane (Surr)	*101*		*80 - 120*
Toluene-d8 (Surr)	*103*		*80 - 120*

QC Sample Results

Client: GeoEngineers Inc
Project/Site: Spokane Public Facilities/12088-006-01

TestAmerica Job ID: 590-9872-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Lab Sample ID: MB 590-19793/1-A
Matrix: Solid
Analysis Batch: 19795

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19793

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		5.0		mg/Kg		11/06/18 14:33	11/06/18 16:43	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*41.5 - 162*	*11/06/18 14:33*	*11/06/18 16:43*	*1*

Lab Sample ID: LCS 590-19793/3-A
Matrix: Solid
Analysis Batch: 19795

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 19793

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	50.0	46.6		mg/Kg		93	74.4 - 124

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*93*		*41.5 - 162*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 590-19833/1-A
Matrix: Solid
Analysis Batch: 19832

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19833

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
2-Methylnaphthalene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
1-Methylnaphthalene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Acenaphthylene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Acenaphthene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Fluorene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Phenanthrene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Anthracene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Fluoranthene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Pyrene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Benzo[a]anthracene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Chrysene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Benzo[b]fluoranthene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Benzo[k]fluoranthene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Benzo[a]pyrene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Indeno[1,2,3-cd]pyrene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Dibenz(a,h)anthracene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1
Benzo[g,h,i]perylene	ND		10		ug/Kg		11/08/18 10:13	11/08/18 12:41	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5	*87*		*23 - 120*	*11/08/18 10:13*	*11/08/18 12:41*	*1*
2-Fluorobiphenyl (Surr)	*78*		*38 - 123*	*11/08/18 10:13*	*11/08/18 12:41*	*1*
p-Terphenyl-d14	*92*		*68 - 136*	*11/08/18 10:13*	*11/08/18 12:41*	*1*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCS 590-19833/2-A
Matrix: Solid
Analysis Batch: 19832

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 19833

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Naphthalene	267	195		ug/Kg		73	41 - 121
2-Methylnaphthalene	267	195		ug/Kg		73	39 - 132
1-Methylnaphthalene	267	227		ug/Kg		85	46 - 131
Acenaphthylene	267	187		ug/Kg		70	56 - 123
Acenaphthene	267	184		ug/Kg		69	43 - 140
Fluorene	267	196		ug/Kg		74	54 - 131
Phenanthrene	267	200		ug/Kg		75	55 - 141
Anthracene	267	259		ug/Kg		97	60 - 129
Fluoranthene	267	221		ug/Kg		83	63 - 141
Pyrene	267	213		ug/Kg		80	62 - 139
Benzo[a]anthracene	267	217		ug/Kg		81	61 - 136
Chrysene	267	222		ug/Kg		83	57 - 144
Benzo[b]fluoranthene	267	211		ug/Kg		79	66 - 141
Benzo[k]fluoranthene	267	208		ug/Kg		78	63 - 150
Benzo[a]pyrene	267	218		ug/Kg		82	60 - 133
Indeno[1,2,3-cd]pyrene	267	213		ug/Kg		80	55 - 142
Dibenz(a,h)anthracene	267	220		ug/Kg		82	60 - 150
Benzo[g,h,i]perylene	267	218		ug/Kg		82	58 - 147

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Nitrobenzene-d5	*83*		*23 - 120*
2-Fluorobiphenyl (Surr)	*78*		*38 - 123*
p-Terphenyl-d14	*90*		*68 - 136*

Lab Sample ID: 590-9872-1 MS
Matrix: Solid
Analysis Batch: 19832

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19833

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Naphthalene	ND		265	172		ug/Kg	☼	65	41 - 121
2-Methylnaphthalene	ND		265	175		ug/Kg	☼	66	39 - 132
1-Methylnaphthalene	ND		265	181		ug/Kg	☼	68	46 - 131
Acenaphthylene	ND		265	173		ug/Kg	☼	65	56 - 123
Acenaphthene	ND		265	166		ug/Kg	☼	63	43 - 140
Fluorene	ND		265	182		ug/Kg	☼	69	54 - 131
Phenanthrene	ND		265	182		ug/Kg	☼	69	55 - 141
Anthracene	ND		265	235		ug/Kg	☼	89	60 - 129
Fluoranthene	ND		265	192		ug/Kg	☼	73	63 - 141
Pyrene	ND		265	209		ug/Kg	☼	79	62 - 139
Benzo[a]anthracene	ND		265	205		ug/Kg	☼	77	61 - 136
Chrysene	ND		265	207		ug/Kg	☼	78	57 - 144
Benzo[b]fluoranthene	ND		265	195		ug/Kg	☼	74	66 - 141
Benzo[k]fluoranthene	ND		265	194		ug/Kg	☼	73	63 - 150
Benzo[a]pyrene	ND		265	204		ug/Kg	☼	77	60 - 133
Indeno[1,2,3-cd]pyrene	ND		265	204		ug/Kg	☼	77	55 - 142
Dibenz(a,h)anthracene	ND		265	207		ug/Kg	☼	78	60 - 150
Benzo[g,h,i]perylene	ND		265	212		ug/Kg	☼	80	58 - 147

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: 590-9872-1 MS
Matrix: Solid
Analysis Batch: 19832

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19833

Surrogate	MS %Recovery	MS Qualifier	Limits
Nitrobenzene-d5	*68*		*23 - 120*
2-Fluorobiphenyl (Surr)	*69*		*38 - 123*
p-Terphenyl-d14	*86*		*68 - 136*

Lab Sample ID: 590-9872-1 MSD
Matrix: Solid
Analysis Batch: 19832

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19833

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Naphthalene	ND		265	183		ug/Kg	☼	69	41 - 121	7	35
2-Methylnaphthalene	ND		265	178		ug/Kg	☼	67	39 - 132	1	35
1-Methylnaphthalene	ND		265	189		ug/Kg	☼	71	46 - 131	5	35
Acenaphthylene	ND		265	184		ug/Kg	☼	69	56 - 123	6	35
Acenaphthene	ND		265	173		ug/Kg	☼	65	43 - 140	4	35
Fluorene	ND		265	193		ug/Kg	☼	73	54 - 131	6	35
Phenanthrene	ND		265	205		ug/Kg	☼	77	55 - 141	12	35
Anthracene	ND		265	268		ug/Kg	☼	101	60 - 129	13	35
Fluoranthene	ND		265	201		ug/Kg	☼	76	63 - 141	5	35
Pyrene	ND		265	219		ug/Kg	☼	82	62 - 139	5	35
Benzo[a]anthracene	ND		265	224		ug/Kg	☼	84	61 - 136	9	35
Chrysene	ND		265	210		ug/Kg	☼	79	57 - 144	2	35
Benzo[b]fluoranthene	ND		265	203		ug/Kg	☼	77	66 - 141	4	35
Benzo[k]fluoranthene	ND		265	201		ug/Kg	☼	76	63 - 150	4	35
Benzo[a]pyrene	ND		265	209		ug/Kg	☼	79	60 - 133	3	35
Indeno[1,2,3-cd]pyrene	ND		265	218		ug/Kg	☼	82	55 - 142	7	35
Dibenz(a,h)anthracene	ND		265	224		ug/Kg	☼	85	60 - 150	8	35
Benzo[g,h,i]perylene	ND		265	224		ug/Kg	☼	84	58 - 147	5	35

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Nitrobenzene-d5	*73*		*23 - 120*
2-Fluorobiphenyl (Surr)	*75*		*38 - 123*
p-Terphenyl-d14	*87*		*68 - 136*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 590-19835/1-A
Matrix: Solid
Analysis Batch: 19837

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19835

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		10		mg/Kg		11/08/18 12:45	11/08/18 14:29	1
Residual Range Organics (RRO) (C25-C36)	ND		25		mg/Kg		11/08/18 12:45	11/08/18 14:29	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	*106*		*50 - 150*	*11/08/18 12:45*	*11/08/18 14:29*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 590-19835/1-A
Matrix: Solid
Analysis Batch: 19837

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19835

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Triacontane-d62	*100*		*50 - 150*	*11/08/18 12:45*	*11/08/18 14:29*	*1*

Lab Sample ID: LCS 590-19835/2-A
Matrix: Solid
Analysis Batch: 19837

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 19835

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics (DRO) (C10-C25)	66.7	62.8		mg/Kg		94	50 - 150
Residual Range Organics (RRO) (C25-C36)	66.7	68.3		mg/Kg		102	50 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*101*		*50 - 150*
n-Triacontane-d62	*99*		*50 - 150*

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 590-19810/2-A
Matrix: Solid
Analysis Batch: 19826

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 19810

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.3		mg/Kg		11/07/18 08:59	11/07/18 14:25	1
Barium	ND		1.3		mg/Kg		11/07/18 08:59	11/07/18 14:25	1
Cadmium	ND		1.0		mg/Kg		11/07/18 08:59	11/07/18 14:25	1
Chromium	ND		1.3		mg/Kg		11/07/18 08:59	11/07/18 14:25	1
Lead	ND		3.0		mg/Kg		11/07/18 08:59	11/07/18 14:25	1
Selenium	ND		5.0		mg/Kg		11/07/18 08:59	11/07/18 14:25	1
Silver	ND		1.3		mg/Kg		11/07/18 08:59	11/07/18 14:25	1

Lab Sample ID: LCS 590-19810/1-A
Matrix: Solid
Analysis Batch: 19826

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 19810

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	50.0	46.0		mg/Kg		92	80 - 120
Barium	50.0	47.8		mg/Kg		96	80 - 120
Cadmium	50.0	47.3		mg/Kg		95	80 - 120
Chromium	50.0	47.1		mg/Kg		94	80 - 120
Lead	50.0	49.3		mg/Kg		99	80 - 120
Selenium	50.0	45.5		mg/Kg		91	80 - 120
Silver	50.0	45.6		mg/Kg		91	80 - 120

1 2 3 4 5 6 7 8 9 10 11 12

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 590-9872-1 MS
Matrix: Solid
Analysis Batch: 19826

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19810

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		44.4	33.3		mg/Kg	☼	75	75 - 125
Barium	13	F1	44.4	48.0		mg/Kg	☼	78	75 - 125
Cadmium	ND		44.4	34.3		mg/Kg	☼	77	75 - 125
Chromium	ND		44.4	34.6		mg/Kg	☼	77	75 - 125
Lead	ND		44.4	36.3		mg/Kg	☼	82	75 - 125
Selenium	ND		44.4	33.3		mg/Kg	☼	75	75 - 125
Silver	ND		44.4	34.0		mg/Kg	☼	77	75 - 125

Lab Sample ID: 590-9872-1 MSD
Matrix: Solid
Analysis Batch: 19826

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19810

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		44.7	33.5		mg/Kg	☼	75	75 - 125	1	20
Barium	13	F1	44.7	45.7	F1	mg/Kg	☼	72	75 - 125	5	20
Cadmium	ND		44.7	34.7		mg/Kg	☼	78	75 - 125	1	20
Chromium	ND		44.7	34.8		mg/Kg	☼	77	75 - 125	1	20
Lead	ND		44.7	36.0		mg/Kg	☼	80	75 - 125	1	20
Selenium	ND		44.7	33.6		mg/Kg	☼	75	75 - 125	1	20
Silver	ND		44.7	34.1		mg/Kg	☼	76	75 - 125	0	20

Lab Sample ID: 590-9872-1 DU
Matrix: Solid
Analysis Batch: 19826

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19810

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	ND		ND		mg/Kg	☼	NC	20
Barium	13	F1	10.4	F3	mg/Kg	☼	26	20
Cadmium	ND		ND		mg/Kg	☼	NC	20
Chromium	ND		ND		mg/Kg	☼	NC	20
Lead	ND		ND		mg/Kg	☼	NC	20
Selenium	ND		ND		mg/Kg	☼	NC	20
Silver	ND		ND		mg/Kg	☼	NC	20

Lab Sample ID: 590-9872-1 DU
Matrix: Solid
Analysis Batch: 19826

Client Sample ID: B-1 (1-2.5)
Prep Type: Total/NA
Prep Batch: 19810

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	ND		ND		mg/Kg	☼	NC	20
Barium	13	F1	11.4		mg/Kg	☼	17	20
Cadmium	ND		ND		mg/Kg	☼	NC	20
Chromium	ND		ND		mg/Kg	☼	NC	20
Lead	ND		ND		mg/Kg	☼	NC	20
Selenium	ND		ND		mg/Kg	☼	NC	20
Silver	ND		ND		mg/Kg	☼	NC	20

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 590-19917/9-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 19946 **Prep Batch: 19917**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		50		ug/Kg		11/15/18 10:38	11/16/18 13:58	1

Lab Sample ID: LCS 590-19917/8-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 19946 **Prep Batch: 19917**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	200	197		ug/Kg		99	80 - 120

Client: GeoEngineers Inc
TestAmerica Job ID: 590-9872-1
Project/Site: Spokane Public Facilities/12088-006-01

Client Sample ID: B-1 (1-2.5) | **Lab Sample ID: 590-9872-1**
Date Collected: 10/25/18 08:50 | **Matrix: Solid**
Date Received: 11/06/18 15:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-1 (1-2.5) | **Lab Sample ID: 590-9872-1**
Date Collected: 10/25/18 08:50 | **Matrix: Solid**
Date Received: 11/06/18 15:00 | **Percent Solids: 98.0**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.10 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 13:30	NMI	TAL SPK
Total/NA	Prep	3050B			1.13 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		2			19826	11/07/18 15:04	JSP	TAL SPK
Total/NA	Prep	7471B			0.62 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		1			19946	11/16/18 14:10	JSP	TAL SPK

Client Sample ID: B-3 (1-2.5) | **Lab Sample ID: 590-9872-2**
Date Collected: 10/25/18 09:50 | **Matrix: Solid**
Date Received: 11/06/18 15:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-3 (1-2.5) | **Lab Sample ID: 590-9872-2**
Date Collected: 10/25/18 09:50 | **Matrix: Solid**
Date Received: 11/06/18 15:00 | **Percent Solids: 97.0**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.13 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 14:44	NMI	TAL SPK
Total/NA	Prep	3050B			1.11 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:17	JSP	TAL SPK
Total/NA	Prep	7471B			0.64 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		1			19946	11/16/18 14:12	JSP	TAL SPK

Client Sample ID: B-6B (0.5-1) | **Lab Sample ID: 590-9872-3**
Date Collected: 10/25/18 13:50 | **Matrix: Solid**
Date Received: 11/06/18 15:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

1 2 3 4 5 6 7 8 9 10 11 12

Client Sample ID: B-6B (0.5-1)

Date Collected: 10/25/18 13:50
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-3
Matrix: Solid
Percent Solids: 96.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.37 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 15:09	NMI	TAL SPK
Total/NA	Prep	3050B			1.15 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:20	JSP	TAL SPK
Total/NA	Prep	7471B			0.60 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		1			19946	11/16/18 14:14	JSP	TAL SPK

Client Sample ID: B-8 (28.5-30

Date Collected: 10/25/18 15:23
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-5
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-8 (28.5-30

Date Collected: 10/25/18 15:23
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-5
Matrix: Solid
Percent Solids: 88.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			6.85 g	5 mL	19793	11/06/18 16:39	MRS	TAL SPK
Total/NA	Analysis	8260C		1	0.86 mL	43 mL	19794	11/06/18 20:14	MRS	TAL SPK
Total/NA	Prep	5035			6.85 g	5 mL	19793	11/06/18 16:39	MRS	TAL SPK
Total/NA	Analysis	NWTPH-Gx		1	0.86 mL	43 mL	19795	11/06/18 20:14	MRS	TAL SPK
Total/NA	Prep	3550C			15.72 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 15:34	NMI	TAL SPK
Total/NA	Prep	3550C			15.71 g	5 mL	19835	11/08/18 12:45	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			19837	11/08/18 16:53	NMI	TAL SPK
Total/NA	Prep	3050B			1.53 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:24	JSP	TAL SPK
Total/NA	Prep	7471B			0.80 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		1			19946	11/16/18 14:17	JSP	TAL SPK

Client Sample ID: B-9 (3.5-5)

Date Collected: 10/26/18 08:32
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-9 (3.5-5)
Date Collected: 10/26/18 08:32
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-6
Matrix: Solid
Percent Solids: 88.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.40 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 20:31	NMI	TAL SPK
Total/NA	Prep	3050B			1.11 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:37	JSP	TAL SPK
Total/NA	Prep	7471B			0.66 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		10			19946	11/16/18 14:46	JSP	TAL SPK

Client Sample ID: B-14 (1-2.5)
Date Collected: 10/26/18 13:50
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-14 (1-2.5)
Date Collected: 10/26/18 13:50
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-7
Matrix: Solid
Percent Solids: 97.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.44 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 16:24	NMI	TAL SPK
Total/NA	Prep	3050B			1.16 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:41	JSP	TAL SPK
Total/NA	Prep	7471B			0.73 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		1			19946	11/16/18 14:27	JSP	TAL SPK

Client Sample ID: B-16 (1-2.5)
Date Collected: 10/26/18 14:40
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-16 (1-2.5)
Date Collected: 10/26/18 14:40
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-8
Matrix: Solid
Percent Solids: 94.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.29 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 16:49	NMI	TAL SPK
Total/NA	Prep	3050B			1.11 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:44	JSP	TAL SPK
Total/NA	Prep	7471B			0.81 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK

Client Sample ID: B-16 (1-2.5) **Lab Sample ID: 590-9872-8**
Date Collected: 10/26/18 14:40 **Matrix: Solid**
Date Received: 11/06/18 15:00 **Percent Solids: 94.7**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	7471B		1			19946	11/16/18 14:30	JSP	TAL SPK

Client Sample ID: B-4 (1-2.5) **Lab Sample ID: 590-9872-9**
Date Collected: 10/25/18 10:15 **Matrix: Solid**
Date Received: 11/06/18 15:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			19812	11/07/18 09:32	TLN	TAL SPK

Client Sample ID: B-4 (1-2.5) **Lab Sample ID: 590-9872-9**
Date Collected: 10/25/18 10:15 **Matrix: Solid**
Date Received: 11/06/18 15:00 **Percent Solids: 95.7**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3550C			15.89 g	2 mL	19833	11/08/18 10:13	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			19832	11/08/18 17:14	NMI	TAL SPK
Total/NA	Prep	3050B			1.12 g	50 mL	19810	11/07/18 08:59	JSP	TAL SPK
Total/NA	Analysis	6010C		1			19878	11/12/18 18:48	JSP	TAL SPK
Total/NA	Prep	7471B			0.65 g	50 mL	19917	11/15/18 10:38	JSP	TAL SPK
Total/NA	Analysis	7471B		1			19946	11/16/18 14:32	JSP	TAL SPK

Laboratory References:

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

Accreditation/Certification Summary

Client: GeoEngineers Inc
TestAmerica Job ID: 590-9872-1
Project/Site: Spokane Public Facilities/12088-006-01

Laboratory: TestAmerica Spokane

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C569	01-06-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Method Summary

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL SPK
NWTPH-Gx	Northwest - Volatile Petroleum Products (GC/MS)	NWTPH	TAL SPK
8270D SIM	Semivolatile Organic Compounds (GC/MS SIM)	SW846	TAL SPK
NWTPH-Dx	Northwest - Semi-Volatile Petroleum Products (GC)	NWTPH	TAL SPK
6010C	Metals (ICP)	SW846	TAL SPK
7471B	Mercury (CVAA)	SW846	TAL SPK
Moisture	Percent Moisture	EPA	TAL SPK
3050B	Preparation, Metals	SW846	TAL SPK
3550C	Ultrasonic Extraction	SW846	TAL SPK
5035	Closed System Purge and Trap	SW846	TAL SPK
7471B	Preparation, Mercury	SW846	TAL SPK

Protocol References:

EPA = US Environmental Protection Agency

NWTPH = Northwest Total Petroleum Hydrocarbon

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

CHAIN OF CUSTODY RECORD

GeoEngineers
523 EAST SECOND AVE.
SPOKANE, WASHINGTON 99202
(509) 363-3125

DATE
PAGE 1 OF 1
LAB
LAB NO.

PROJECT NAME/LOCATION: Spokane Public Facilities - Sportsplex
PROJECT NUMBER: 12088-006-01
PROJECT MANAGER: David Lauder
SAMPLED BY: Jason Besendorfer (JJB)

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED				NOTES/COMMENTS (Preserved, filtered, etc.)
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	RCRA 8 Metals	PAHs	NWTPH Gx/Dx	VOCs	
	B-1 (1-2.5)	10/25/18	08:50	S	1	X	X			
	B-3 (1-2.5)	10/25/18	09:50	S	1	X	X			
OOB	~~B-4 (3.5-5)~~	~~10/25/18~~								
	B-6 (0.5-1)	10/25/18	13:50	S	1	X	X			
	B-8 (28.5-30)	10/25/18	15:23	S	1	X	X			
	B-8 (28.5-30)	10/25/18	15:23	S	2-VOAs			X	X	
	B-9 (3.5-5)	10/26/18	08:32	S	1	X	X			
	B-14 (1-2.5)	10/26/18	13:50	S	1	X	X			
	B-16 (1-2.5)	10/26/18	14:40	S	1	X	X			
	B-4 (1-2.5)	10/25/18	10:15	S	1	X	X			

590-9872 Chain of Custody

RELINQUISHED BY — FIRM: GEI SIGNATURE: Jason J Besendorfer PRINTED NAME: Jason Besendorfer DATE: 10/6/18 TIME: 15:00	RELINQUISHED BY — FIRM: TA Spo SIGNATURE: Sheila Kraft PRINTED NAME: Sheila Kraft DATE: 11/6/18 TIME: 1500	RELINQUISHED BY — FIRM: SIGNATURE: PRINTED NAME: DATE: TIME:
RECEIVED BY — FIRM: SIGNATURE: PRINTED NAME: DATE: TIME:	RECEIVED BY — FIRM: SIGNATURE: PRINTED NAME: DATE: TIME:	RECEIVED BY — FIRM: SIGNATURE: PRINTED NAME: DATE: TIME:

ADDITIONAL COMMENTS: 2.1°C IRCOU

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 590-9872-1

Login Number: 9872
List Number: 1
Creator: Kratz, Sheila J

List Source: TestAmerica Spokane

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	No analysis requiring residual chlorine check assigned.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

TestAmerica Job ID: 590-9872-2
Client Project/Site: Spokane Public Facilities/12088-006-01

For:
GeoEngineers Inc
523 East Second Ave
Spokane, Washington 99202

Attn: Dave Lauder

Authorized for release by:
12/6/2018 9:52:45 AM

Randee Arrington, Project Manager II
(509)924-9200
randee.arrington@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1 2 3 4 5 6 7 8 9 10 11 12 13

Table of Contents

Case Narrative

Client: GeoEngineers Inc
Project/Site: Spokane Public Facilities/12088-006-01

TestAmerica Job ID: 590-9872-2

Job ID: 590-9872-2

Laboratory: TestAmerica Spokane

Narrative

Receipt
The samples were received on 11/6/2018 3:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1º C.

Receipt Exceptions
The following sample was activated for 6010C TCLP Lead and WDOE 80-12 Fish Bioassay analysis by the client on 11/16/18: B-9 (3.5-5) (590-9872-6). This analysis was not originally requested on the chain-of-custody (COC).

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: GeoEngineers Inc
Project/Site: Spokane Public Facilities/12088-006-01

TestAmerica Job ID: 590-9872-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
590-9872-6	B-9 (3.5-5)	Solid	10/26/18 08:32	11/06/18 15:00

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: B-9 (3.5-5)

Lab Sample ID: 590-9872-6

Date Collected: 10/26/18 08:32
Matrix: Solid
Date Received: 11/06/18 15:00

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	**0.77**		0.060		mg/L		11/28/18 12:42	11/29/18 10:12	1

Method: 6010C - Metals (ICP)

Lab Sample ID: LCS 590-20045/1-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 20059 **Prep Batch: 20045**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	1.00	1.02		mg/L		102	80 - 120

Lab Sample ID: LB 590-20026/1-B **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 20059 **Prep Batch: 20045**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.060		mg/L		11/28/18 12:42	11/28/18 15:53	1

Lab Sample ID: 590-9970-A-1-D MS **Client Sample ID: Matrix Spike**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 20059 **Prep Batch: 20045**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	0.088		1.00	1.12		mg/L		103	75 - 125

Lab Sample ID: 590-9970-A-1-E MSD **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 20059 **Prep Batch: 20045**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	0.088		1.00	1.13		mg/L		104	75 - 125	0	20

Lab Sample ID: 590-9970-A-1-C DU **Client Sample ID: Duplicate**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 20059 **Prep Batch: 20045**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Lead	0.088		0.0900		mg/L		3	20

Client Sample ID: B-9 (3.5-5)
Date Collected: 10/26/18 08:32
Date Received: 11/06/18 15:00

Lab Sample ID: 590-9872-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.10 g	2001.21 mL	20026	11/27/18 12:52	JSP	TAL SPK
TCLP	Prep	3010A			50 mL	50 mL	20045	11/28/18 12:42	JSP	TAL SPK
TCLP	Analysis	6010C		1			20066	11/29/18 10:12	JSP	TAL SPK

Laboratory References:

TAL ASL = TestAmerica ASL, 1100 NE Circle Blvd, Suite 310, Corvallis, OR 97330, TEL (541)243-0980

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

BIOASSAY REPORT

96-HOUR STATIC
WDOE HAZARDOUS WASTE DESIGNATION
BIOASSAY CONDUCTED
November 22 through 26, 2018

Prepared for

TESTAMERICA - SPOKANE
SPOKANE, WASHINGTON

Prepared by

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
ASL

1100 NE Circle Boulevard, Suite 310
Corvallis, Oregon 97330
541-243-6137

NELAC #OR100022
State of Washington Department of Ecology (WDOE), Lab ID C1233
California State Environmental Laboratory Accreditation Program, Certificate No.: 1726

Report Date: December 5, 2018
Lab I.D. Nos. B4155

CONTENTS

INTRODUCTION

TestAmerica ASL (TA-ASL) – Aquatic Toxicology Laboratory conducted a 96-hour Washington State Hazardous Waste Regulation bioassay using rainbow trout (*Oncorhynchus mykiss*) on a sample provided by TestAmerica - Spokane.

The testing was conducted from November 22 through 26, 2018, on a sample labeled:
'B-9 (3.5-5)'

Regulatory threshold tested:
'Dangerous Waste' or DW designation (a sample concentration of 100 mg/L)

OVERVIEW OF REGULATORY GUIDANCE

The following provides an overview and excerpts of applicable permit specifics, regulatory guidance, and other relevant information. This is intended only as a helpful guide, from a laboratory perspective, for understanding test outcomes. The final responsibility for interpretation of results remains with the client and/or regulatory agency.

The following is taken from the WDOE guidance (Method 80-12, Part A, June 2009 revision):

> "The Washington State Department of Ecology (Ecology) developed the acute fish toxicity test (Method 80-12) to determine if a waste meets the definition of dangerous waste in the *Dangerous Waste Regulations*, Chapter 173-303 WAC."
>
> "If the toxicity of a waste is unknown, the waste must be tested for dangerous waste designation using Method 80-12. The waste concentrations of 100 mg/L and 10 mg/L were selected to correspond with the definitions of dangerous waste and extremely hazardous waste, respectively."
>
> "This method determines if the sample waste LC_{50} is significantly less than or equal to the regulatory threshold of 100 mg/L dangerous waste (DW), 10 mg/L extremely hazardous waste (EHW) …"
>
> "Waste designated by Method 80-12 [as DW or EHW] must be regulated and managed as specified in WAC 173-303 …"

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The following is taken from *Dangerous Waste Regulations*, Chapter 173-303 WAC:

> 100 (5)(c)(ii): "The EHW … bioassay. To determine if a waste is EHW, a person must establish the toxicity of a waste by means of the fish bioassay at 10 mg/L …"
>
> - **"If the data from the test indicates that the waste is EHW, then the person will assign the dangerous waste number WT01."**
> - **"Otherwise, the waste will be designated DW, and the person will assign the dangerous waste number WT02." [**unless DW testing proves otherwise]
>
> 100 (5)(c)(i): "The DW bioassay. To determine if a waste is DW, a person must establish the toxicity category range of a waste by means of the 100 mg/L acute static fish test …"
>
> - **"If the data from the test indicates that the waste is DW, then the person will assign the dangerous waste number WT02."**
> - **"Otherwise, the waste is not regulated as toxic dangerous waste."**
>
> 100 (5)(d): "If the designation acquired from book designation and bioassay data do not agree, then bioassay data will be used to designate a waste. If a waste is designated as DW or EHW following the book designation procedure, a person may test the waste by means of the … static acute fish … method, to demonstrate that the waste is not a dangerous waste or should be designated as DW and not EHW."

SUMMARY OF TEST RESULTS

Exhibit 1 provides a summary of the final test results.

EXHIBIT 1
Summary of Static Acute Test Results

Sample ID	Does the sample designate as an Extremely Hazardous Waste (EHW)?	Does the sample designate as a Dangerous Waste (DW)?
'B-9 (3.5-5)'	NA	No

METHODS AND MATERIALS

TEST METHODS

The test was performed according to: *Biological Testing Methods*, Washington State Department of Ecology, DOE 80-12, Revised June 2009.

DEVIATIONS FROM PROTOCOLS

Deviations from required procedures in the test methods:

None noted.

Deviations from recommended procedures in the test methods:

None noted.

TEST DESIGN

The following summarizes the conditions used for both overall testing and the specifics for each test (observations and notations can be found on the datasheets in Appendix A):

Overall Test Design:

O. mykiss Acute test: 100 mg/L sample (dangerous waste designation) + dilution water for the control.

Test Organism Conditions:

All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by WDOE (2009).

The test organisms appeared vigorous and in good condition prior to testing.

O. mykiss acute test:

Source: Thomas Fish Company, Anderson, California

Age:

- 30 to 90 days old (After Swim Up), within a 24 hour age range
- Minimum 7 day acclimation period prior to test initiation

Design: Three test vessels per concentration, Ten organisms per vessel

Loading of Test Chambers: Less than 0.8 g of fish per Liter of water

Test Solution Preparation:

- Sample particles were reduced (as needed) to smaller than ~ 1 cm in its narrowest dimension.
- Appropriate amount of sample was placed into borosilicate glass jar with 200 ml of dilution water and tumbled for ~ 18 hours at ambient lab temperatures (~ 23 ^{o}C).

- o Jar and all contents placed into aquaria containing additional volume of dilution water to create final sample concentration.
- o Test organisms introduced to test chambers within 30 minutes of jar addition.

Test Solution Renewal: None

Monitoring:

- o Test Initiation: DO and pH; all test chambers
- o Test Initiation: Temperature, Conductivity, Hardness, and Alkalinity; all concentrations
- o Daily: Survival, DO, and pH; all test chambers
- o Daily: Temperature and Survival, DO, pH, and temperature; all concentrations.
- o Test Termination: Survival, DO, and pH; all test chambers
- o Test Termination: Temperature, Conductivity, Hardness, and Alkalinity; all concentrations

Termination: 96 hours.

Endpoints: Survival (at termination)

DILUTION WATER

The dilution water used was the standard culture water used by TA-ASL:

Reconstituted, moderately hard water (as per EPA protocol) with a total hardness of 80 to 100 mg/L as $CaCO_3$ and an alkalinity of 60 to 70 mg/L as $CaCO_3$.

SAMPLE COLLECTION AND STORAGE

Sample collection was performed by TA-Spokane personnel. The samples were accepted as scheduled by TA-ASL. Chain of Custody and Sample Receipt Records are provided in Appendix C.

Following receipt, the samples were stored in the dark at 0 to 6 C until test solutions were prepared and tested.

All sample(s) were subsampled and the extraction process begun within 45 days of sample collection.

DATA ANALYSIS

The statistical analyses performed for the acute tests were those outlined in *Biological Testing Methods*, Washington State Department of Ecology, DOE 80-12, Revised June 2009.

The statistical outputs are included with each test’s datasheets in Appendix A.

RESULTS AND DISCUSSION

The raw data sheets are presented in Appendix A.

WDOE Method 80-12 DEFINITION

Extremely Hazardous Waste (EHW): 96 hr LC_{50} concentration less than or equal to 10 mg/L.
Dangerous Waste (DW): 96 hr LC_{50} concentration less than or equal to 100 mg/L.

ACUTE BIOASSAY

Table 1 summarizes the survival data for the *O. mykiss* acute testing.

Table 1
Summary of Acute Results – 96 hour exposure
O. mykiss

Sample	Concentration (mg/L)	Number Dead/ Number Tested
Control	0	1/30
'B-9 (3.5-5)'	100	0/30

According to the definitions listed above, the 'B-9 (3.5-5)' sample should not be classified as a "Dangerous Waste".

The dissolved oxygen concentration remained at 6.0 mg/L or greater throughout the testing period. Other than noted, test temperatures remained in the range of 12±1.0 C.

The *O. mykiss* acute test meets Test Acceptability Criteria (TAC) of a minimum 90 percent control survival. The tests proceeded without any noted deviations or interruptions that could have affected test results. The testing should be considered "valid".

REFERENCE TOXICANT TEST

Reference toxicant (reftox) testing is performed to document both initial and ongoing laboratory performance of the test method(s). While the health of the test organisms is primarily evaluated by the performance of the laboratory control, reftox test results also may be used to assess the health and sensitivity of the test organisms. Reftox test results within their respective cumulative summary (cusum) chart limits are indicative of consistent laboratory performance and normal test organism sensitivity.

The results of the reftox tests conducted using potassium chloride indicate that the test organisms were within their respective cusum chart range based on EPA guidelines.

The data sheets for the reference toxicant tests are provided in Appendix B.

Table 2 summarizes the reference toxicant test results and Cusum chart limits.

Table 2
Reference Toxicant Test (g/L)

Species	**LC_{50}**	**Control Chart limits**
Oncorhynchus mykiss	1.45	0.71 to 3.08

Accreditation/Certification Summary

Client: GeoEngineers Inc
Project/Site: Spokane Public Facilities/12088-006-01

TestAmerica Job ID: 590-9872-2

Laboratory: TestAmerica Spokane

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C569	01-06-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte

Laboratory: TestAmerica ASL

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	1726	03-18-19
Iowa	State Program	7	418	09-01-20
Oregon	NELAP	10	OR100022	03-18-19
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-17-00268	08-02-20
Washington	State Program	10	C556	06-22-19

Method Summary

Client: GeoEngineers Inc
Project/Site: Spokane Public Facilities/12088-006-01

TestAmerica Job ID: 590-9872-2

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL SPK
Subcontract	WDOE 80-12 DW Designation	None	TAL ASL
1311	TCLP Extraction	SW846	TAL SPK
3010A	Preparation, Total Metals	SW846	TAL SPK

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL ASL = TestAmerica ASL, 1100 NE Circle Blvd, Suite 310, Corvallis, OR 97330, TEL (541)243-0980

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

CHAIN OF CUSTODY RECORD

GeoEngineers
523 EAST SECOND AVE.
SPOKANE, WASHINGTON 99202
(509) 363-3125

DATE
PAGE 1 OF 1
LAB
LAB NO.

PROJECT NAME/LOCATION Spokane Public Facilities - Sportsplex
PROJECT NUMBER 12088-006-01
PROJECT MANAGER David Lauder
SAMPLED BY Jason Besendorfer (JJB)

LAB	GEOENGINEERS	DATE	TIME	MATRIX	# OF JARS	RCRA 8 Metals	PAHs	NWTPH G-x / Dx	VOCs	NOTES/COMMENTS (Preserved, filtered, etc.)
	B-1 (1-2.5)	10/25/18	08:50	S	1	X	X			
	B-3 (1-2.5)	10/25/18	09:50	S	1	X	X			
	~~B-4 (3.5-5)~~	~~10/25/18~~								
	B-6 (0.5-1)	10/25/18	13:50	S	1	X	X			
	B-8 (28.5-30)	10/25/18	15:23	S	1	X	X			
	B-8 (28.5-30)	10/25/18	15:23	S	2 - VOAs			X	X	
	B-9 (3.5-5)	10/26/18	08:32	S	1	X	X			
	B-14 (1-2.5)	10/26/18	13:50	S	1	X	X			
	B-16 (1-2.5)	10/26/18	14:40	S	1	X	X			
	B-4 (1-2.5)	10/25/18	10:15	S	1	X	X			

590-9872 Chain of Custody

RELINQUISHED BY	RELINQUISHED BY	RELINQUISHED BY
FIRM GEI	FIRM TA Spo	FIRM
SIGNATURE Jason J Besendorfer	SIGNATURE Sheila Kraft	SIGNATURE
PRINTED NAME Jason Besendorfer	PRINTED NAME Sheila Kraft	PRINTED NAME
DATE 10/6/18 TIME 15:00	DATE 11/6/18 TIME 1500	DATE TIME

RECEIVED BY	RECEIVED BY	RECEIVED BY
FIRM	FIRM	FIRM
SIGNATURE	SIGNATURE	SIGNATURE
PRINTED NAME	PRINTED NAME	PRINTED NAME
DATE TIME	DATE TIME	DATE TIME

ADDITIONAL COMMENTS: 2.1°C IR COOL

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12/6/2018

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 590-9872-2

Login Number: 9872
List Number: 1
Creator: Kratz, Sheila J

List Source: TestAmerica Spokane

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	No analysis requiring residual chlorine check assigned.

APPENDIX D
Soil Management Plan

Soil Management Plan

Proposed Sportsplex Project
Spokane, Washington

for
Spokane Public Facilities District

March 6, 2019

GeoEngineers
Earth Science + Technology

Soil Management Plan

Proposed Sportsplex Project
Spokane, Washington

for
Spokane Public Facilities District

March 6, 2019

GeoEngineers

523 East Second Avenue
Spokane, Washington 99202
509.363.3125

Soil Management Plan

Proposed Sportsplex Project
Spokane, Washington

File No. 12088-006-03

March 6, 2019

Prepared for:

Spokane Public Facilities District
720 West Mallon Avenue
Spokane, Washington 99201

Attention: Stephanie Curran, CEO

Prepared by:

GeoEngineers, Inc.
523 East Second Avenue
Spokane, Washington 99202
509.363.3125

Jedidiah R. Sugalski, PE
Environmental Engineer

Teresa A. Dugger, PE
Associate

JRS:JRG:BDW:tjh:tlm:mce

GEOENGINEERS

Table of Contents

1.0 INTRODUCTION

This Soil Management Plan (SMP) provides soil handling recommendations for construction of the proposed Sportsplex Project in downtown Spokane, Washington (herein referred to as the "Sportsplex"). The approximate location of the project site is shown in the Figure 1, Vicinity Map and the proposed Sportsplex footprint is shown on the Figure 2, Site Plan.

This SMP provides guidance to the Spokane Public Facilities District (PFD), the general contractor and subcontractors that could perform earthwork activities at the Sportsplex. The objectives of the plan are to: (1) disclose the potential presence of potential contaminants of concern (COCs); (2) minimize risks to worker health/safety and the environment; and (3) outline general procedures for handling and disposing contaminated soil if encountered during construction activities. This plan does not address dewatering considerations that would be associated with deep excavations encountering groundwater.

Previous investigations have identified COCs greater than Model Toxics Control Act (MTCA) Method A cleanup levels at the site. Table D.1 provides a summary of COCs for the Sportsplex and general metal concentrations for natural soil conditions in the Spokane area. These values may be used in comparison to site-specific test results.

TABLE D.1. SITE COCS AND MTCA METHOD A SOIL CLEANUP LEVELS FOR UNRESTRICTED LAND USE

Parameter		MTCA Method A Unrestricted Land Use Cleanup Levels (mg/kg)	Spokane Basin Background Metal Concentration (mg/kg)
Total Petroleum Hydrocarbons	Gasoline Range Organics	100/30[2]	NE
	Diesel Range Organics	2,000	NE
	Heavy Oil	2,000	NE
Metals	Arsenic	20	9.34
	Barium	NE	NE
	Cadmium	2	0.7
	Chromium	2,000	17.8
	Lead	250	14.9
	Silver	NE	NE
	Selenium	NE	NE
	Mercury	2	20
PAHs	Benzo(a)pyrene	0.1	NE
	Naphthalenes[3]	5	NE
	cPAHs Toxic Equivalency[4]	0.1	NE

Notes:

[1] Background concentration referenced is the Washington State Department of Ecology (Ecology) Natural Background 90th percentile value for the Spokane Basin (Ecology 1994).

[2] Cleanup level is 100 mg/kg for gasoline mixtures without benzene and the total BTEX compounds are less than 1 percent of the total mixture. The cleanup level for all other gasoline mixtures is 30 mg/kg.

[3] Cleanup level for total naphthalenes (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene)

[4] Toxic equivalency for carcinogenic poly aromatic hydrocarbons (cPAHs) calculated using the toxic equivalency factors found in MTCA Table 708-2.

mg/kg = milligrams per kilogram; NE = Not Established

2.0 HEALTH AND SAFETY

Excavation and other major construction activities involving suspected contaminated soil shall be conducted by Hazardous Waste Operations and Emergency Response (HAZWOPER) trained personnel with a minimum of 24-hours training in accordance with 29 code of federal regulations subsection 1910.12 (29 CFR § 1910.120) and Washington Administrative Code (WAC) Title 296 Chapter 843 (WAC 296-843). In addition to HAZWOPER training, the earthwork contractor shall prepare a site-specific Health and Safety Plan (HASP) describing potential COCs and exposure pathways, appropriate personal protective equipment (PPE) requirements and emergency response plans.

3.0 ENVIRONMENTAL PROFESSIONAL

An environmental professional (a person meeting the education, training and experience requirements of 40 CFR § 312.10[b]) shall be retained to observe and document excavation activities and consult with the PFD and their earthwork contractor(s) regarding soil disposal or reuse during construction. The frequency and duration of on-site observation will depend on the nature of construction sequencing and the final design. The environmental professional shall assist the earthwork contractor and PFD with:

- Identifying potentially contaminated on-site soil (fill and native material);
- Collecting profile and excavation soil samples;
- Providing soil profile documentation; and
- Assisting the PFD with obtaining disposal approval.

The environmental professional also shall document the contaminated soil excavation and handling activities and provide the required reports to Washington State Department of Ecology (Ecology) on behalf of the PFD.

4.0 DOCUMENTATION

Information regarding the location and characteristics of Contaminated Soil or Impacted Soil (which are defined later in this document) shall be documented in a characterization report so that future activities completed in those affected or modified areas can be appropriately planned with regard to health and safety, characterization and soil management. Reports shall include:

- Descriptions of field and construction activities;
- Exploration, excavation and sampling locations;
- Dimensions of explorations and excavations;

- A description of the soil encountered; and
- Results of field screening and laboratory chemical analysis.

Reports shall be filed with Ecology's Eastern Regional Office, and other local and state agencies as applicable.

5.0 SOIL CHARACTERIZATION

To characterize soil for offsite disposal or stormwater infiltration, environmental sampling shall be conducted. Representative soil samples shall be submitted for laboratory chemical analysis to characterize environmental conditions. Based on the site history, the COCs at the site include petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and metals. Chemical analysis shall include:

- Total Petroleum Hydrocarbons (NWTPH-HCID);
- PAHs (EPA 8270D); and
- Metals (EPA 6010):
  - Arsenic;
  - Barium;
  - Cadmium;
  - Chromium;
  - Lead;
  - Mercury;
  - Selenium; and
  - Silver.

If any metal is detected at a concentration equal to or exceeding 20 times it's Resource Conservation and Recovery Act (RCRA) maximum toxicity characteristic concentration, the sample shall be analyzed using Toxicity Characteristic Leaching Procedure (TCLP) to determine if leachable metals exceed RCRA toxicity concentrations. Soil with TCLP metals concentrations greater than the RCRA regulatory limits shall be considered a Dangerous Waste if disposed off-site. Table D.2 below summarizes the RCRA toxicity characteristic regulatory levels.

TABLE D.2. MAXIMUM TOXICITY CHARACTERISTIC CONTAMINANT CONCENTRATIONS

Contaminant	TCLP Regulatory Level (mg/L)	Soil Concentration Requiring TCLP Analysis, 20x Regulatory Level (mg/kg)
Arsenic	5	100
Barium	100	2,000
Cadmium	1	20
Chromium	5	100
Lead	5	100
Mercury	0.2	4

Contaminant	TCLP Regulatory Level (mg/L)	Soil Concentration Requiring TCLP Analysis, 20x Regulatory Level (mg/kg)
Selenium	1	20
Silver	5	100

Notes: mg/L = milligrams per liter

If petroleum hydrocarbons are detected at concentrations greater than the MTCA Method A Unrestricted Land Use cleanup criteria, follow-up analysis shall include more precise hydrocarbon analysis methods including NWTPH-Gx and NWTPH-Dx for gasoline-, and diesel- and oil-range hydrocarbons, respectively. Some site soil might contain organic matter or man-made heavy oils such as cooking grease. NWTPH-Dx with silica gel cleanup will be used as applicable to reduce the potential for biogenic interference, provided initial NWTPH-Dx analyses indicate that non-total petroleum hydrocarbons (TPH) hydrocarbons could be a significant component of the TPH being detected in soil; or if comparative results of NWTPH-Dx with and without silica gel cleanup on the same samples indicate biogenic interference. Additional testing might be required if petroleum hydrocarbons are detected above laboratory reporting limits in accordance with MTCA Table 830-1, Required Testing for Petroleum Releases. This includes polychlorinated biphenyls (PCBs) using EPA Method 8082 and other fuel additives and blending compounds.

If field screening of soil samples indicates volatile organic compound (VOC) concentrations greater than 10 parts per million (ppm) as measured with a calibrated photoionization detector (PID), then the soil sample shall also be analyzed for VOCs using EPA method 8260. An X-ray fluorescence (XRF) machine also can be used to field-screen soil for metals.

After review of the chemical analytical data, the soil represented by analyzed sample shall be categorized into one of the three soil categories described in Section 6.0.

6.0 SOIL CATEGORIES AND DEFINITIONS

Three soil handling categories were developed to guide the PFD, general contractor and associated subcontractors during soil excavation activities. This section defines soil categories and Section 7.0 discusses specific soil excavation and handling protocols for each soil category. Use of these categories and protocols is predicated on subsurface soil within each project area being adequately characterized and extents of each soil category sufficiently delineated.

6.1. Contaminated Soil

For the purposes of soil handling for the Sportsplex, soil is considered "contaminated" if:

- Contaminant concentrations for any analyte exceed MTCA Method A Unrestricted Land Use cleanup criteria;
- Contaminant concentrations meet or exceed Dangerous Waste and Dangerous Waste source criteria as defined in WAC 173-303;
- TCLP results exceed RCRA regulatory levels; or

- Physical evidence of contamination (sheen, odor, staining) is observed, unless additional chemical analysis is performed to further categorize the soil and the results of that analysis do not meet any of the three criteria described above.

6.2. Impacted Soil

Soil is considered "impacted" if:

- Contaminant concentrations for metals exceed published Washington State background concentrations for the Spokane area but are less than the respective MTCA Method A Unrestricted Land Use cleanup criteria; or
- Contaminant concentrations for other analytes exceed laboratory reporting limits but are less than the respective MTCA Method A Unrestricted Land Use cleanup criteria.

6.3. Clean Soil

Soil is considered "clean" if:

- Contaminant concentrations for metals are less than twice the published Washington State background concentrations for the Spokane area (Ecology 1994);
- Contaminant concentrations for other analytes are not detected at concentrations that exceed the respective method reporting limit; and
- Physical evidence of contamination (sheen, odor or staining) is **not** observed.

Method reporting limits for non-detected COCs must be less than applicable MTCA Method A Unrestricted Land Use cleanup criteria for soil to be considered "clean".

7.0 SOIL EXCAVATION AND HANDLING RECOMMENDATIONS

Each soil category requires special handling and reuse procedures. The following sections provide additional information on handling each soil category. A flow chart is provided on Figure D-1, Acceptable Soil Uses to assist with categorizing soil and determining suitable uses and restrictions.

In areas where soil will not be covered by an impermeable surface (concrete, asphalt, masonry work, etc.), characterization soil samples representative of soil left in place shall be collected by the environmental professional. Characterization soil sample locations shall be documented with Global Position System (GPS) coordinates and shall be submitted for chemical analysis in accordance with the test methods described in Section 5.0. Specific on-site soil reuse areas for Contaminated Soil or Impacted Soil may be designated during construction.

7.1. Contaminated Soil

Contaminated Soil includes Dangerous Waste or soil where COC concentrations are **greater** than the MTCA Method A Unrestricted Land Use cleanup criteria. Special handling and end use considerations are needed for soil categorized as contaminated. Special handling and disposal shall include the following:

- **Soil Excavation and Segregation:** The PFD's environmental professional shall be on-call during applicable excavation of Contaminated Soil to field screen soil and collect characterization soil samples as needed. Field screening methods are described in Appendix D.1 of this SMP. The earthwork contractor shall segregate Contaminated Soil from clean soil if practical. Characterization soil samples shall be collected to represent soil left in place if the soil will not be covered by an impermeable surface.

- **Loading/Transportation/Stockpiling:** Soil categorized as Dangerous Waste or Contaminated Soil can either be loaded directly into trucks and transported for off-site permitted disposal or reused at the site. If Contaminated Soil will not be hauled off-site or used immediately, it can be temporarily stockpiled on plastic sheeting (Visqueen), pending disposal or evaluation for reuse. Stockpiles shall be surrounded by sand bags and covered with plastic sheeting to minimize contaminant runoff and wind-blown dust. The sand bags shall reduce the potential for stormwater to run onto, or leachate to flow from, the stockpiles; additionally, the sand bags may be used to anchor the plastic sheeting. Additional soil handling requirements might be provided in the approved erosion and sediment control plan.

  Contaminated Soil may be screened on site to separate grain sizes greater than 1-inch-diameter from finer material. Material greater than 1-inch-diameter may be combined with Impacted Soil for on-site reuse or disposed as Clean Soil. The earthwork contractor shall develop and maintain a procedure to track Contaminated Soil loads transported off site for permitted disposal. The earthwork contractor shall develop and maintain dust suppression and wash water handling procedures for screening operations.

- **Acceptable Uses of Contaminated Soil**: The acceptable use of contaminated soil depends on the COCs and the concentrations.
  - Dangerous Waste shall be disposed off-site at an approved landfill.
  - Contaminated Soil with VOCs less than reporting limits may be suitable for use under buildings, structures and roads if soil engineering properties meet geotechnical requirements for the proposed application. If soil is contaminated with VOCs at concentrations greater than MTCA Method A Unrestricted Land Use cleanup criteria, the soil shall be disposed off-site. If Contaminated Soil has VOCs greater than reporting limits, but less than MTCA Method A Unrestricted Land Use cleanup criteria, the soil can be used in open areas under roads or walkways, but not within 20 feet of buildings and structures where vapors could accumulate within enclosed areas.

    Contaminated Soil identified for reuse shall be placed above the mean high groundwater table level and more than 12 inches below finished grade if not covered by an impervious surface. Permanent stormwater infiltration infrastructure shall not be designed to allow infiltration of stormwater into and through Contaminated Soil left in place. Soil with obvious petroleum contamination should be disposed off-site.

- **Disposal/Recycling Facilities:** Contaminated Soil can be transported to the selected disposal facility after approval is granted by the facility. Additional chemical analysis might be required by the disposal facility before material acceptance. Potential disposal/recycling facilities include the following:
  - Waste Management's Graham Road Landfill in Medical Lake, Washington.
  - Waste Management's Columbia Ridge Landfill in Arlington, Oregon for disposal of Dangerous Waste.

7.2. Impacted Soil

Impacted Soil is defined as soil with COCs concentrations **greater** than laboratory reporting limits, but **less** than MTCA Method A Unrestricted Land Use cleanup criteria. Special handling and end use considerations are needed for Impacted Soil. Special handling and disposal shall include the following:

- **Soil Excavation and Segregation**: The environmental professional shall be on-call and on-site during applicable excavation of Impacted Soil to field screen soil and collect characterization soil samples as needed. The earthwork contractor shall segregate Impacted Soil from soil of other categories as practical.
- **Loading/Transportation/Stockpiling:** Impacted Soil can either be loaded directly into trucks or temporarily stockpiled on plastic sheeting (Visqueen) at the Sportsplex or other designated areas. Stockpiles shall be surrounded by sand bags and covered with plastic sheeting to minimize contaminant runoff and wind-blown dust. The sand bags shall reduce the potential for stormwater to run onto, or leachate to flow from, the stockpiles; additionally, the sand bags may be used to anchor the plastic sheeting. Additional soil handling requirements might be provided in the approved erosion and sediment control plan.
- **Acceptable Uses of Impacted Soil**: Impacted Soil not tested for VOCs or with VOCs less than laboratory reporting limits might be suitable for use under buildings, structures, roads, under landscape areas and within utility corridors if soil engineering properties meet geotechnical requirements for the proposed application. If Impacted Soil has VOCs greater than reporting limits, the soil can be used in open areas under roads or walkways, but not within 20 feet of buildings and structures where vapors could accumulate in enclosed areas.

  Impacted Soil shall be placed above the mean high groundwater table level and more than 6 inches below finished grade if not covered by an impervious surface.
- **Disposal/Recycling Facilities:** Impacted Soil can be transported to a selected disposal facility after approval is granted by the facility, if needed. Additional chemical analysis might be required by the disposal facility before material acceptance.

7.3. Clean Soil

Clean soil includes soil where COCs are not detected or metal concentrations were detected at concentrations that represent no greater than background conditions. There are no special handling or end-use requirements for this soil. Characterization soil samples shall be collected represent soil left in place.

7.4. Equipment

Soil and debris shall be removed from excavation equipment used to handle contaminated soil and vehicles driven over on-site fill. The earthwork contractor shall dedicate specific excavation equipment for handling on-site contaminated soil to reduce the required decontamination efforts. Trucks used to transport Contaminated and Impacted Soil offsite shall be covered with tarps to minimize wind-blown loss of contaminated materials over the haul route.

7.5. Dust Control

The earthwork contractor shall minimize fugitive dust generated from on-site fill by actively suppressing dust. Dust control can include but is not limited to:

- Clearing only those areas where immediate activity will take place while maintaining original ground cover as long as practical.

- Spraying exposed surfaces with water or other suitable palliative and repeating as necessary throughout the course of construction. Water applied as dust control shall not leave the site as surface runoff.

8.0 DISCOVERY OF UNEXPECTED POTENTIALLY CONTAMINATED/IMPACTED SOIL OR USTS

The environmental professional shall be on-call and available to perform field screening and characterization sampling as needed during construction activities. However, during construction activities, it is the PFD's, general contractor's or earthwork subcontractor's responsibility to identify potentially Contaminated/Impacted Soil as described below, and to notify the PFD and the environmental professional immediately after the discovery. Additionally, historic site uses indicate undocumented underground storage tanks (USTs) may be encountered during construction activities for the Sportsplex. It is general contractor's or any subcontractor's responsibility to stop all work near the UST and notify the PFD and the environmental professional immediately upon discovery.

8.1. Unexpected Potentially Contaminated or Impacted Soil

Excavated soil from a location shall be considered to be petroleum-contaminated/impacted if it exhibits one or more of the following physical characteristics:

- Staining;
- Petroleum hydrocarbon or other odors associated with VOCs;
- A moderate or heavy sheen when placed in contact with water; and/or
- Significant concentrations of organic vapors detected using headspace field screening methods.

If soil exhibiting one or more of the above characteristics is discovered that has not been previously identified and categorized, the general contractor or identifying subcontractor shall notify the PFD immediately for characterization prior to removal and/or disposal. A "Potentially Contaminant-Impacted Soil Notification Form" is presented in Appendix D.2, Field Procedures. Upon discovery of potentially contaminated/impacted soil, any subcontractor completing earthwork-related activities shall refer to this guide for contact information of people to notify as well as information regarding the location, type and actions taken to address the potentially Contaminated Soil.

8.2. Undocumented UST Discovery

Several USTs have been previously in use at the Sportsplex. Additional undocumented USTs could be present within the construction area.

USTs encountered during construction shall be removed in accordance with the "Underground Storage Tank Regulations" (WAC 173-360) and Ecology "Guidance for Site Checks and Site Assessments for Underground Storage Tanks" dated April 2003. A Washington State Site Assessment certified representative shall be present on the Sportsplex during the removal of the USTs.

If a UST is discovered, the subcontractors completing earthwork-related activities shall stop work near the UST and notify the PFD immediately. The subcontractor also shall immediately notify Ecology and the Fire Marshall. Characterization of contents and the surrounding soil shall be performed prior to removal and/or disposal using the "Potentially Contaminant-Impacted Soil Notification Form" in Appendix D.2. Upon discovery of a UST and associated potentially contaminated/impacted soil adjacent to, or in the vicinity of the UST, the subcontractor shall refer to this guide for contact information of people to notify as well as information regarding the actions taken to address the discovery.

If discovery of a previously unknown UST results in a release, first take steps to ensure the safety of workers at the site. The subcontractor shall stop work near the UST and notify the PFD immediately. If safe to do so, take appropriate steps to contain the release including pumping out fluids to a different container and excavating soil where the release occurred. The PFD shall call an environmental professional and a licensed UST removal contractor. A tank removal and site characterization plan should be developed for the response.

9.0 CONTACT INFORMATION

If unexpected potentially contaminated soil, undocumented USTs or potentially contaminated groundwater is discovered during construction activities, the general contractor or appropriate subcontractor shall notify the PFD. As stated previously, in the event an undocumented UST is discovered, Ecology and the Fire Marshall also shall be immediately notified. Table D.3 provides contact information in the event previously unknown contamination or a UST is discovered.

TABLE D.3. RELEVANT PROJECT CONTACTS

Name	Title	Phone	Email
PFD			
Monte Koch	Director of Facilities and Operations	Office: 509.279.7169 Mobile: 509.951.6969	mkoch@spokanepfd.org
Spokane Fire Department			
Michael Miller	Fire Marshall	509.625.7040	mmiller@spokanecity.org
Ecology			
Eastern Regional Office	Receptionist	509.329.3400	NA

10.0 LIMITATIONS

We have prepared this report for the exclusive use of the PFD and their authorized agents. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, shall be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix E, titled "Report Limitations and Guidelines for Use," for additional information pertaining to use of this report.

11.0 REFERENCES

CH2MHill, 1999. "Report of Findings, Phase II Environmental Site Assessment Limited Subsurface Exploration, Howard Street Property". April 1999.

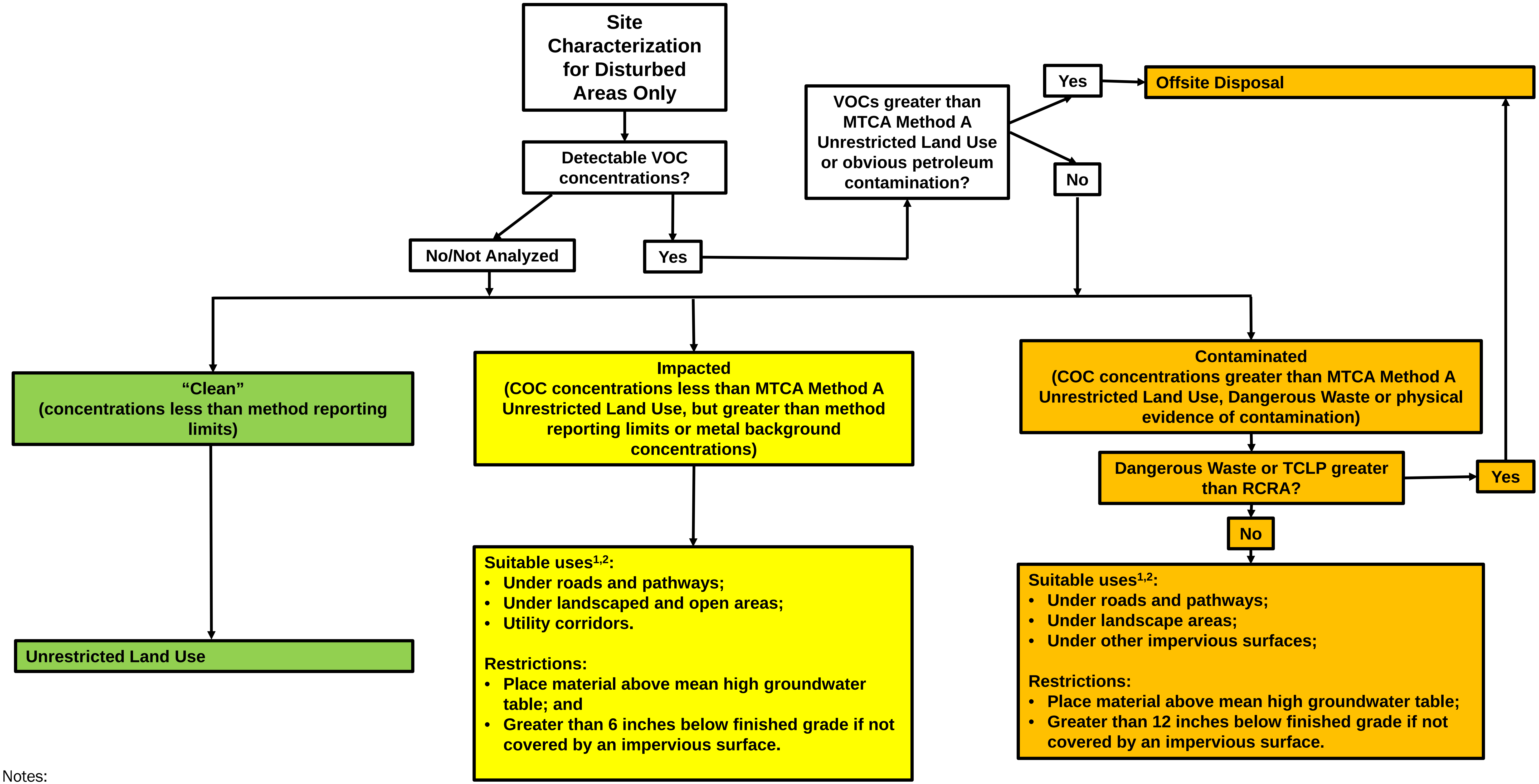
CH2MHill, 1999. "Technical Memorandum. Focused Subsurface Investigation Report Findings Howard Street Property". Prepared for the City of Spokane Department by CH2M Hill Spokane. November 2, 1999.

Washington State Department of Ecology. 1994. "Natural Background Soil Metals Concentrations in Washington State." Toxics Cleanup Program, Washington State Department of Ecology, Publication #94-115, October 1994.

Washington State Department of Ecology. 2007. Model Toxics Control Act Cleanup Regulations, Washington Administrative Code, Chapter 173-340.

FIGURES

GeoEngineers



Notes:

1. If VOCs are less than laboratory reporting limits the soil can be used under buildings or structures if soil properties meet geotechnical requirements.
2. If VOCs are greater than laboratory reporting limits, but less than MTCA Method A for Unrestricted Land Use, the soil can be used in open areas under roads and pathways, but not within 20 feet of buildings and structures where vapors could accumulate within enclosed areas if soil properties mee geotechnical requirements.

MTCA - Washington State Department of Ecology Model Toxics Control Act.
VOCs – Volatile Organic Compounds
PAHs – Polycyclic Aromatic Hydrocarbons
COCs – Contaminants of Concern
RCRA – Resource Conservation and Recovery Act
TCLP – Toxicity Characteristic and Leaching Procedure

Acceptable Soil Uses

Sportsplex Soil Management Plan
Spokane, Washington

GeoEngineers

Figure D-1

File No. 12088-006-03 3/6/2019

APPENDICES

GeoEngineers

APPENDIX D.1
Field Procedures

APPENDIX D.1
FIELD PROCEDURES

Field Screening of Soil Samples

Soil samples obtained from explorations shall be evaluated for evidence of possible contamination using field screening techniques. Field screening results can be used as a general guideline to delineate areas of possible petroleum- or VOC-related contamination in soil. In addition, screening results are often used as a basis for selecting soil samples for chemical analysis. The screening methods employed shall include: (1) visual examination; (2) water sheen testing; and (3) headspace vapor testing using a photoionization detector (PID).

Visual screening consists of observing the soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Sheen screening is a more sensitive screening method that can be effective in detecting petroleum-based products.

Water sheen testing involves placing soil in water and observing the water surface for signs of sheen. Sheens are classified as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly.
Moderate Sheen (MS)	Light to heavy sheen, may have some color/iridescence; spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Headspace vapor screening involves placing a soil sample in a plastic bag. Air is captured in the bag, and the bag is shaken to expose the soil to the air trapped in the bag. The probe of the PID is inserted into the bag. The PID measures the concentration of photoionizable gases and vapors in the sample bag headspace. The PID is designed to quantify photoionizable gases and vapors up to 2,000 ppm, and is calibrated with isobutylene. A lower threshold of significance of 1 ppm is used in application.

Field screening results are site- and exploration- specific. The results may vary with temperature, moisture content, soil lithology, organic content and type of contaminant.

APPENDIX D.2
Potentially Contaminant-Impacted Soil Notification Form

PFD Sportsplex
POTENTIALLY CONTAMINANT IMPACTED SOIL NOTIFICATION FORM

Prepared for:	GENERAL INFORMATION	
Spokane Public Facilities District (PFD) 720 West Mallon Avenue Spokane, Washington 99201	DATE OF DISCOVERY:	TIME OF DISCOVERY:
	PERSON DISCOVERING CONDITION:	PHONE NUMBER:
Prepared by: GeoEngineers 523 East Second Avenue Spokane, WA 99202 509.363.3125	PERSON FILLING OUT FORM:	PHONE NUMBER:
	APPROXIMATE LOCATION OF SOIL ON THE SITE:	

SOIL CHARACTERISTICS

PHYSICAL CHARACTERISTICS:

Odor:
- ☐ Yes (Describe__________)
- ☐ No

Staining:
- ☐ Yes (Describe__________)
- ☐ No

Other: ____________________

____

SOIL DISTURBED:
- ☐ Soil in-place
- ☐ Soil stockpiled

FREE LIQUIDS:
- ☐ Yes (Content_______%)
- ☐ No

ACTIONS TAKEN: ____________________________________

____

____

____

____

ESTIMATED VOLUME OF CONTAMINATED SOIL:

NOTIFICATION CONTACT INFORMATION

PFD	Environmental Professional	Contractor
Monte Koch 509.951.6969 mkoch@spokanepfd.org		

ADDITIONAL INFORMATION

This record serves to document information, actions, and notifications regarding the discovery of and response to the presence of suspected and known contamination on the project.

GeoEngineers

APPENDIX E
Report Limitations and Guidelines for Use

APPENDIX E
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know more how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical and Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the Spokane Public Facilities District for the project specifically identified in the report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the project, and its schedule and budget, GeoEngineers' services have been executed in accordance with our Agreement with the Spokane Public Facilities District dated February 18, 2019, and generally accepted geotechnical practices in this area at the time this report was prepared. GeoEngineers does not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

A Geotechnical Engineering or Geologic Report is based on a Unique Set of Project-Specific Factors

This report has been prepared for the proposed Sportsplex project in Spokane, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

---

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, GeoEngineers can provide written modifications or confirmation, as appropriate.

Environmental Concerns are Not Covered

Unless environmental services were specifically included in GeoEngineers' scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Uncertainty May Remain Even After Our Services are Completed

Performance of the limited environmental assessment services is intended to reduce uncertainty regarding the potential for contamination in connection with a property, but no ESA can wholly eliminate that uncertainty. Our interpretation of subsurface conditions in this study is based on field observations and chemical analytical data from widely spaced sampling locations. It is always possible that contamination exists in areas that were not explored, sampled or analyzed.

Geotechnical, Geologic and Most Environmental Findings are Professional Opinions

GeoEngineers' interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. GeoEngineers' report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Report Recommendations are Not Final

GeoEngineers has developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if GeoEngineers does not perform construction observation.

GeoEngineers recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by constructors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

Contractors are Responsible for Site Safety on Their Own Construction Projects

GeoEngineers' geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialty.

ATTACHMENT F

Carnation Dairy Environmental Assessment, GeoEngineers 2019

GeoEngineers
523 East Second Avenue
Spokane, Washington 99202
509.363.3125

June 20, 2019

City of Spokane
Parks and Recreation Department
808 West Spokane Falls Boulevard, 5th Floor
Spokane, Washington 99201

Attention: Berry Ellison
Riverfront Park Program Manager

Subject: Carnation Dairy Environmental Assessment
Riverfront Park
Spokane, Washington
File No. 0110-148-16

GeoEngineers, Inc. (GeoEngineers) is pleased to present this letter report describing the results of assessment activities at the Carnation Dairy Site located at 444 West Cataldo Avenue in Spokane, Washington (herein referred to as the "site") as depicted in Vicinity Map, Figure 1. Key site features are depicted in Site Plan, Figure 2. The site is also identified as tax parcel 35181.4206.

GeoEngineers, on behalf of the City of Spokane (City), submitted an application for the Voluntary Cleanup Program (VCP) to engage Washington State Department of Ecology (Ecology) in discussions regarding proposed development and assessment activities at the site for the Sportsplex project. The Sportsplex project will be a large multiuse regional sports facility used to host large sports-themed tournaments and to be used as a practice and competition venue for local sport groups. The site is recorded as Ecology Site No. 16256288, VCP Project No, EA 0344.

The goal of this assessment was to evaluate the site for petroleum contamination and provide recommendations to address the contamination if warranted and accommodate construction of the Sportsplex project.

INTRODUCTION AND PROJECT UNDERSTANDING

It is our understanding that the City of Spokane (City) plans to construct the Sportsplex project at the site and that the City would like to import soil contaminated with polycyclic aromatic hydrocarbons (PAHs) and metals from the neighboring Riverfront Park to fill low areas at the site. The low areas subsequently will be capped with buildings or asphalt parking in anticipation of construction of the Sportsplex project.

CH2M Hill, Inc. (CH2M) conducted a Phase II environmental site assessment (ESA) at the site in 1999, which included advancing 11 test pits on or near the site. Petroleum contamination in soil greater than the Model Toxics Control Act (MTCA) Method A cleanup level was identified in one test pit, TP-4, which was advanced in the area of former fuel dispensers adjacent to the southeast corner of the building identified in the Phase I Environmental site Assessment (ESA) conducted in 1998 (Leppo 1998). Heavy petroleum staining and odor were observed approximately 4 feet below ground surface (bgs) where bedrock was encountered. The contamination appeared to extend to the foundation of the dairy garage to the west and to the north. Analytical results indicated gasoline-range petroleum hydrocarbons (GRPH), diesel-range petroleum hydrocarbons (DRPH) and oil-range petroleum hydrocarbons (ORPH) were detected at concentrations greater than the MTCA Method A cleanup levels (CH2M 1999).

SCOPE OF SERVICES

Our scope of services for the assessment included:

1. Preparing a work plan that described the sample locations, methods and analytical methods.
2. Coordinating underground utility locating using the one-call system. Per state regulations, the proposed exploration locations were marked in white prior to initiating the locate request.
3. Subcontracting with Spokane Environmental Solutions (SES) to advance test pit excavations at the locations identified in the work plan.
4. Observing and documenting subsurface soil conditions using a qualified field geologist. Soil from each test pit was field-screened using visual observations, water sheen and headspace vapor measurements with a photoionization detector (PID) to assess possible presence of petroleum-related contaminants.
5. Collecting soil samples from each test pit and submitting select samples to Eurofins TestAmerica Laboratories (TestAmerica), in Spokane Valley, Washington, for chemical analysis. Soil samples exhibiting the greatest indications of petroleum contamination from each test pit were collected and placed in laboratory-prepared containers. Soil samples were analyzed for the following potential contaminants:
   a. GRPH using Northwest Method NWTPH-Gx;
   b. DRPH and ORPH using Northwest Method NWTPH-Dx; and
   c. Benzene, toluene, ethylbenzene and xylene (BTEX) using Environmental Protection Agency (EPA) Method 8260C.
6. Comparing soil chemical analytical results to MTCA Method A cleanup levels.
7. Preparing this letter report that provides a summary of the field and laboratory data, comparison of analytical results to MTCA and our interpretations.

FIELD ACTIVITIES

GeoEngineers advanced test pit excavations on May 23, 2019, and obtained soil samples for field screening and laboratory chemical analysis. The goal of the test pit excavation was to define the nature and extent of petroleum contamination in soil at the site, if present.

GeoEngineers located excavations in the field and marked the site with white paint prior to the May 2019 field activities. The state one-call utility locate service was contacted on May 17, 2019. Test pit excavations CD-TP-1 through CD-TP-3 were completed by SES using a Caterpillar mini-excavator at the locations shown on Figure 2.

Test pit excavations were advanced to refusal, which resulted in depths of 2½ to 4½ feet bgs. Upon completion of each test pit, material removed from the excavation was placed back into the test pit at the approximate depth from which it was removed. Soil was placed in approximately 1-foot lifts and compacted with the excavator's bucket. Logs of test pit explorations are attached.

Soil samples were generally collected from near the center of the excavator bucket, at approximately 1-foot intervals starting at about 1 foot bgs. If field screening indicated the presence of petroleum contamination, a soil sample was obtained from that depth. Samples were field-screened using visual observations, water sheen testing and headspace vapor measurements with a PID in accordance with the Work Plan (GeoEngineers 2019).

SURFACE AND SUBSURFACE CONDITIONS

In general, the site is unpaved with the surface composed of gravel with varying amounts of silt and sand. Gravel with varying amounts of silt, sand, cobbles and debris (generally consisting of metal, brick, glass, and wood) were observed in the test pits to the total depths excavated. Dark gray staining, interpreted as petroleum staining, was observed in test pits CD-TP-1 through CD-TP-3 at depths of approximately 1 to 2 feet bgs. None of the samples collected from the test pits exhibited evidence of petroleum hydrocarbons using water sheen and PID measurements. Test pits CD-TP-1 and CD-TP-2 encountered refusal in broken basalt rock that was interpreted as bedrock. Groundwater was not encountered in the test pit excavations.

A bollard located north of the former dispenser area, as shown on Figure 2, was removed prior to the May 2019 field activities. Removal of the bollard resulted in an opened, shallow excavation, that measured approximately 3 feet in depth. Material observed within the bollard excavation generally consisted of gravel with varying amounts of silt, sand, cobbles and debris (generally consisting of metal and brick). Dark gray staining was not observed in the subsurface near the removed bollard.

CHEMICAL ANALYTICAL RESULTS

Soil samples were submitted to TestAmerica in Spokane, Washington for chemical analysis. Samples collected from test pits CD-TP-1 and CD-TP-3, from depths exhibiting the greatest indications of petroleum contamination based on visual observations, were submitted for chemical analysis. Soil samples were analyzed for:

- GRPH using Northwest Method NWTPH-GX;
- DRPH and ORPH using Northwest Method NWTPH-Dx; and
- BTEX using EPA Method 8260C.

Chemical analytical results are summarized and compared to MTCA Method A cleanup levels for unrestricted land use in Table I.

TABLE I: CHEMICAL ANALYTICAL RESULTS - SOIL

Analyte[1]	Units	MTCA A CUL[2]	Sample Location ID (Depth[3])	
			CD-TP-1 (1.0-2.0)	CD-TP-3 (0.5-1.0)
GRPH	mg/kg	30	**24**	**16**
DRPH		2,000	**220**	**1,400**
ORPH		2,000	**520**	**410**
Benzene		0.03	<0.023	<0.023
Toluene		7	<0.12	**0.041**
Ethylbenzene		6	<0.12	<0.12
Xylene, m-,p-		9	<0.47	**0.097**
Xylene, o-			<0.23	**0.029**
Total Xylenes			<0.70	**0.13**

Notes:

[1]Samples analyzed by TestAmerica Laboratories.

[2]Model Toxics Control Act (MTCA) Method A unrestricted cleanup levels referenced from CLARC Master Spreadsheet.

[3]Depth range shown as feet below existing grade.

mg/kg = milligrams per kilogram; CUL = cleanup level

Bold indicates that the analyte was detected at a concentration greater than the laboratory reporting limit.

Contaminant concentrations were less than MTCA Method A cleanup levels for unrestricted land use in samples analyzed. TestAmerica's laboratory report is attached.

SUMMARY AND INTERPRETATIONS

Soil assessment activities were conducted on May 23, 2019, at the Carnation Dairy site located at 444 West Cataldo Avenue in Spokane, Washington. Three test pits (CD-TP-1 through CD-TP-3) were advanced to depths ranging from 2½ to 4½ feet bgs. Observed soil consisted of fine to coarse gravel with varying amounts of silt, sand, cobbles and debris (generally consisting of metal brick, glass and wood). Groundwater was not encountered in the test pit excavations.

Soil samples were submitted from test pits CD-TP-1 and CD-TP-3 for analysis of the contaminants listed above. Contaminant concentrations were either less than laboratory reporting limits or less than MTCA Method A cleanup levels for unrestricted land use in samples analyzed. Based on the chemical analytical results, in our opinion, petroleum contamination greater than MTCA Method A cleanup level is not present in the vicinity of the former fuel dispenser and remediation at the site is not necessary. It is likely that petroleum concentrations reported 20 years ago at this location have decreased as a result of natural attenuation. Metals and PAH contamination greater than MTCA Method A cleanup levels as a result of historical industrial use and activities that occurred in and around Riverfront Park are still present at the site.

RECOMMENDATIONS

In our opinion, the site is suitable for the placement of soil from Riverfront Park which is contaminated with the same contaminants (metals and PAHs) from the same former industrial and railroad-related activities. We recommend requesting a No Further Action designation for petroleum contamination from the Washington State Department of Ecology. If metals and PAH soil is placed at the site, an environmental covenant will be filed for the parcel which identifies the location and extent of known contamination and prevents future site use from allowing migration or unnecessary exposure to the contaminants.

REFERENCES

CH2M HILL, Inc. 1999. "Phase II Environmental Site Assessment Limited Subsurface Exploration, 'Howard Street Property.'" April 1999.

GeoEngineers, Inc. 2019. "Sampling and Analysis Plan, Carnation Dairies Spokane." GEI File No. 0110-148-16. April 26, 2019.

Leppo Consultants, Inc. 1998. "Phase I Environmental Site Assessment, Mallon Street Property." November 1998.

We appreciate the opportunity to provide the City of Spokane with our services. Please contact us if you have any questions or comments.

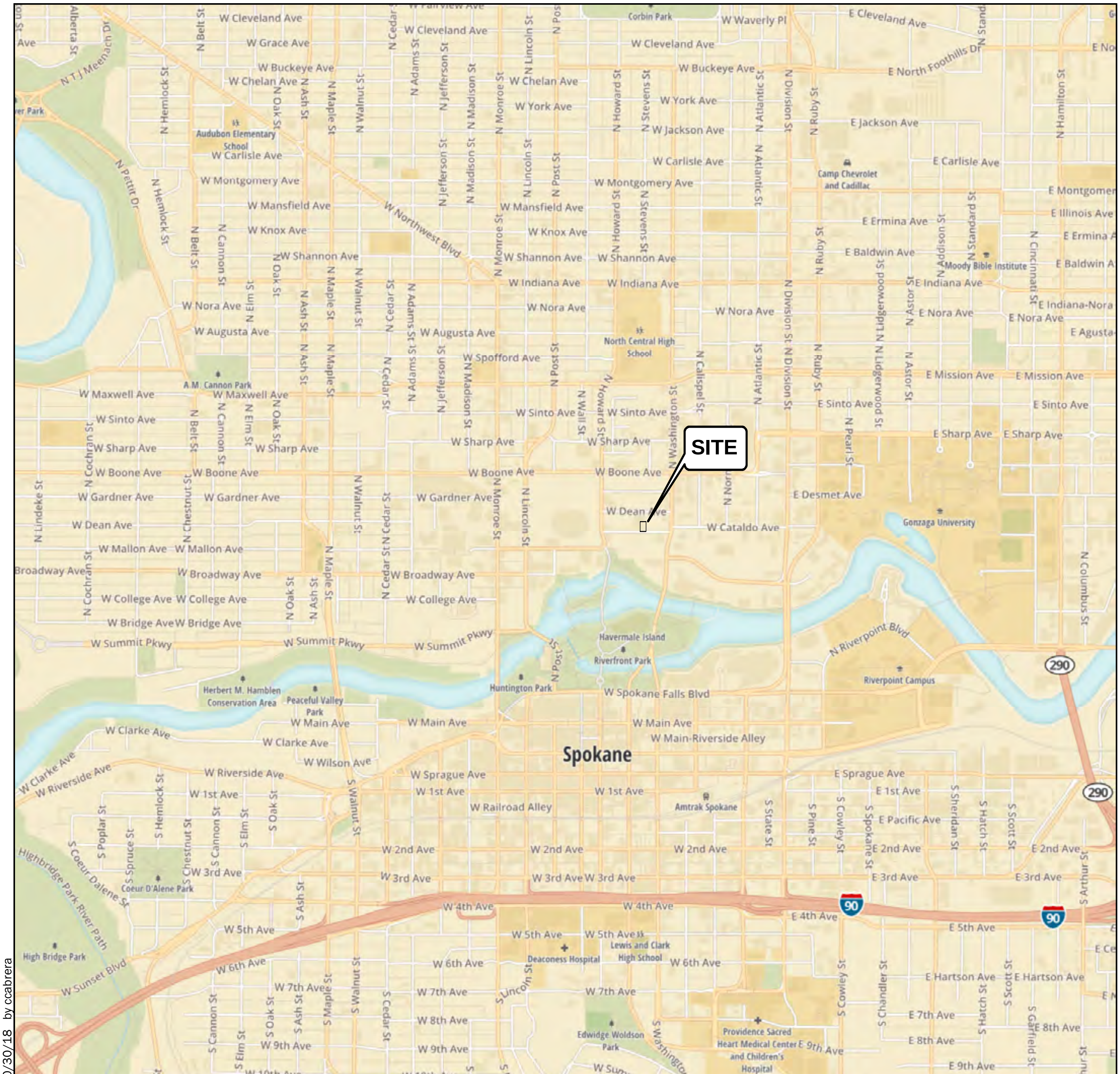
Sincerely,
GeoEngineers, Inc.

Jedidiah R. Sugalski, PE
Environmental Engineer

Bruce D. Williams
Principal

JWR:JRS:BDW:tjh

Attachments:
Figure 1. Vicinity Map
Figure 2. Site Plan
Logs of Test Pits
Report of Laboratory Analysis, Eurofins TestAmerica, June 2019



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2,000 0 2,000

Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2018

Projection: NAD 1983 UTM Zone 11N

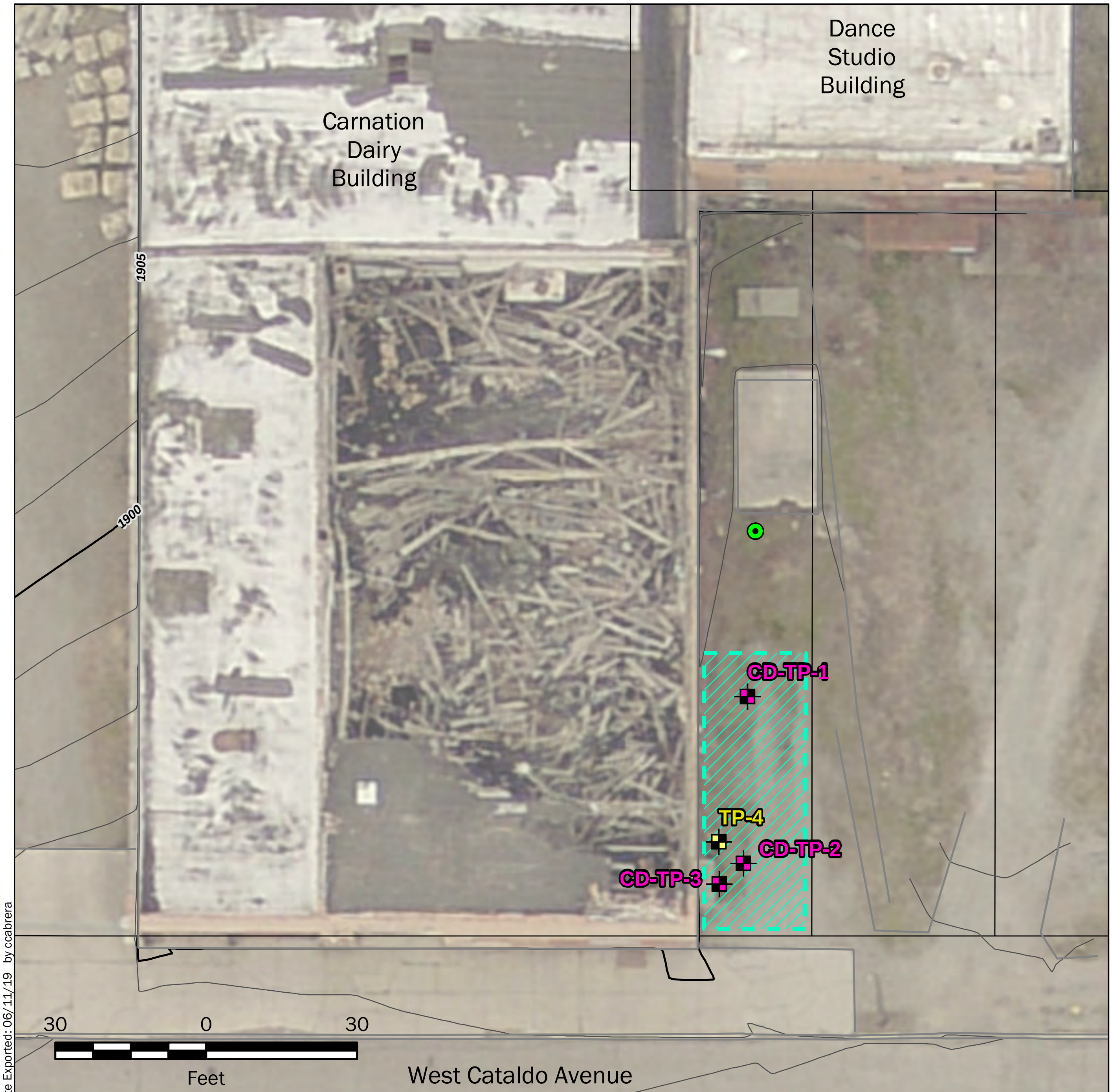
Vicinity Map

Carnation Dairy Environmental Assessment
Spokane, Washington

GEOENGINEERS

Figure 1

P:\12\12088006\GIS\MXD\1208800601_F01_VicinityMap.mxd Date Exported: 10/30/18 by ccabrera



P:\0\0110148\GIS\16\011014816_F02_SitePlan_TPs2019_ZoomedIn.mxd Date Exported: 06/11/19 by ccabrera

Legend

- Removed Bollard
- Approximate Test Pit Location (CH2MHill, March 1999)
- Approximate Test Pit Location (GeoEngineers, May 2019)
- Former Dispenser Area
- Major Contour (5 Foot)
- Minor Contour (1 Foot)
- Parcels

N
W E
S

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from ESRI,
Parcels from Spokane County, Borings from CH2MHill and Anania site plans.

Projection: WGS 1984 Web Mercator Auxiliary Sphere

Site Plan

Carnation Dairy Environmental Assessment
Spokane, Washington

GeoEngineers

Figure 2

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab
- Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

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Figure A-1

Date Excavated	5/23/2019	Total Depth (ft)	4.5	Logged By	JWR	Excavator	Spokane Environmental Solutions	Groundwater not observed
				Checked By		Equipment	Cat B08 Mini Excavator	Caving not observed

Surface Elevation (ft)	1902	Easting (X)	2481443	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	261643	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	Notes
					GP	Gray fine to coarse gravel, trace silt and sand (loose, moist)			
1901	1		1 CA		GP	Brown fine to coarse gravel, trace silt and sand, occasional cobbles and debris (brick, metal, glass and plastic) (medium dense, moist)	NS	0.0	
						Thin layer of dark gray staining			
1900	2		2				NS	0.0	
						Thin layer of dark gray staining			
1899	3								
			3		SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist)	NS	0.0	
1898	4								Refusal at 4½ feet below the ground surface due to broken basalt

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-1

GeoEngineers

Project: Carnation Dairy Proposed Riverfront Park North Bank
Project Location: Spokane, Washington
Project Number: 0110-148-16

Figure A-2
Sheet 1 of 1

Date Excavated	5/23/2019	Total Depth (ft)	4	Logged By JWR Checked By	Excavator: Spokane Environmental Solutions Equipment: Cat B08 Mini Excavator	Groundwater not observed Caving not observed	

Surface Elevation (ft) Vertical Datum	1904 NAVD88	Easting (X) Northing (Y)	2481444 261621	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	Notes
	0				GP	Gray fine to coarse gravel, trace silt and sand			
			1				NS	0.0	
						Thin layer of dark gray staining			
1903	1					Brown fine to coarse gravel, trace silt and sand, occasional cobbles and debris (metal, brick, glass, wood) (medium dense, moist)			
			2				NS	0.0	
1902	2					Thin layer of dark gray staining			
1901	3		3		SP-SM	Brown fine to coarse sand with silt and gravel, broken basalt (medium dense, moist)	NS	0.0	
1900	4								Refusal at 4 feet below the ground surface due to broken basalt

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-2

GeoEngineers

Project: Carnation Dairy Proposed Riverfront Park North Bank
Project Location: Spokane, Washington
Project Number: 0110-148-16

Date Excavated	5/23/2019	Total Depth (ft)	2.5	Logged By	JWR	Excavator	Spokane Environmental Solutions	Groundwater not observed
				Checked By		Equipment	Cat B08 Mini Excavator	Caving not observed

Surface Elevation (ft)	1904	Easting (X)	2481436	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	261615	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	Notes
	0				GP	Brown fine to coarse gravel, trace silt and sand, occasional debris (brick, metal)			
			1 / CA				NS	0.0	
						Thin layer of dark gray staining			
1903	1				SP-SM	Brown fine to coarse sand with silt and gravel, occasional debris (brick, metal) (medium dense, moist)			
1902	2		2				NS	0.0	
									Completed at 2½ feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-3

GeoEngineers

Project: Carnation Dairy Proposed Riverfront Park North Bank
Project Location: Spokane, Washington
Project Number: 0110-148-16

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

Laboratory Job ID: 590-11079-1
Client Project/Site: Carnation Dairies/0110-148-16

For:
GeoEngineers Inc
523 East Second Ave
Spokane, Washington 99202

Attn: JR Sugalski

Authorized for release by:
6/4/2019 4:02:34 PM

Randee Arrington, Project Manager II
(509)924-9200
randee.arrington@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1 2 3 4 5 6 7 8 9 10 11 12

Table of Contents

Job ID: 590-11079-1

Laboratory: Eurofins TestAmerica, Spokane

Narrative

Receipt
The samples were received on 5/23/2019 11:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 15.8º C.

Receipt Exceptions
The following samples were received at the laboratory outside the required temperature criteria: CD-TP-1 (1.0-2.0) (590-11079-1), CD-TP-3 (0.5-1.0) (590-11079-2) and Trip Blank (590-11079-3). The samples are considered acceptable since it was collected and submitted to the laboratory on the same day and there is evidence that the chilling process has begun.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA
Method NWTPH-Dx: Detected hydrocarbons in the diesel range appear to be due to heavily weathered diesel and or a light weight oil in the following samples: CD-TP-1 (1.0-2.0) (590-11079-1) and CD-TP-3 (0.5-1.0) (590-11079-2).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: GeoEngineers Inc
Project/Site: Carnation Dairies/0110-148-16

Job ID: 590-11079-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
590-11079-1	CD-TP-1 (1.0-2.0)	Solid	05/23/19 09:30	05/23/19 11:40	
590-11079-2	CD-TP-3 (0.5-1.0)	Solid	05/23/19 10:10	05/23/19 11:40	
590-11079-3	Trip Blank	Solid	05/23/19 09:30	05/23/19 11:40	

Definitions/Glossary

Client: GeoEngineers Inc | Job ID: 590-11079-1
Project/Site: Carnation Dairies/0110-148-16

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: GeoEngineers Inc | Job ID: 590-11079-1
Project/Site: Carnation Dairies/0110-148-16

Client Sample ID: CD-TP-1 (1.0-2.0) | Lab Sample ID: 590-11079-1

Date Collected: 05/23/19 09:30 | **Matrix: Solid**
Date Received: 05/23/19 11:40 | **Percent Solids: 93.8**

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.023	0.012	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1
Ethylbenzene	ND		0.12	0.019	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1
m,p-Xylene	ND		0.47	0.034	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1
o-Xylene	ND		0.23	0.027	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1
Toluene	ND		0.12	0.016	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1
Xylenes, Total	ND		0.70	0.034	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*93*		*75 - 120*	*05/24/19 09:04*	*05/28/19 20:24*	*1*
4-Bromofluorobenzene (Surr)	*103*		*76 - 122*	*05/24/19 09:04*	*05/28/19 20:24*	*1*
Dibromofluoromethane (Surr)	*96*		*80 - 120*	*05/24/19 09:04*	*05/28/19 20:24*	*1*
Toluene-d8 (Surr)	*104*		*80 - 120*	*05/24/19 09:04*	*05/28/19 20:24*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**24**		5.8	2.1	mg/Kg	☼	05/24/19 09:04	05/28/19 20:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*41.5 - 162*	*05/24/19 09:04*	*05/28/19 20:24*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	**220**		10	4.4	mg/Kg	☼	06/03/19 11:20	06/03/19 20:21	1
Residual Range Organics (RRO) (C25-C36)	**520**		26	5.2	mg/Kg	☼	06/03/19 11:20	06/03/19 20:21	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*99*		*50 - 150*	*06/03/19 11:20*	*06/03/19 20:21*	*1*
n-Triacontane-d62	*108*		*50 - 150*	*06/03/19 11:20*	*06/03/19 20:21*	*1*

Client Sample ID: CD-TP-3 (0.5-1.0) | Lab Sample ID: 590-11079-2

Date Collected: 05/23/19 10:10 | **Matrix: Solid**
Date Received: 05/23/19 11:40 | **Percent Solids: 92.9**

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.023	0.012	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1
Ethylbenzene	ND		0.12	0.019	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1
m,p-Xylene	**0.097**	**J**	0.47	0.034	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1
o-Xylene	**0.029**	**J**	0.23	0.027	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1
Toluene	**0.041**	**J**	0.12	0.016	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1
Xylenes, Total	**0.13**	**J**	0.70	0.034	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*90*		*75 - 120*	*05/24/19 09:04*	*05/28/19 17:07*	*1*
4-Bromofluorobenzene (Surr)	*98*		*76 - 122*	*05/24/19 09:04*	*05/28/19 17:07*	*1*
Dibromofluoromethane (Surr)	*96*		*80 - 120*	*05/24/19 09:04*	*05/28/19 17:07*	*1*
Toluene-d8 (Surr)	*108*		*80 - 120*	*05/24/19 09:04*	*05/28/19 17:07*	*1*

Client Sample Results

Client: GeoEngineers Inc
Project/Site: Carnation Dairies/0110-148-16

Job ID: 590-11079-1

Client Sample ID: CD-TP-3 (0.5-1.0)

Lab Sample ID: 590-11079-2
Date Collected: 05/23/19 10:10
Matrix: Solid
Date Received: 05/23/19 11:40
Percent Solids: 92.9

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**16**		5.9	2.1	mg/Kg	☼	05/24/19 09:04	05/28/19 17:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*41.5 - 162*	*05/24/19 09:04*	*05/28/19 17:07*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	**1400**		11	4.4	mg/Kg	☼	06/03/19 11:20	06/03/19 20:41	1
Residual Range Organics (RRO) (C25-C36)	**410**		26	5.3	mg/Kg	☼	06/03/19 11:20	06/03/19 20:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*60*		*50 - 150*	*06/03/19 11:20*	*06/03/19 20:41*	*1*
n-Triacontane-d62	*98*		*50 - 150*	*06/03/19 11:20*	*06/03/19 20:41*	*1*

Client Sample ID: Trip Blank

Lab Sample ID: 590-11079-3
Date Collected: 05/23/19 09:30
Matrix: Solid
Date Received: 05/23/19 11:40

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.020	0.010	mg/Kg		05/24/19 09:04	05/28/19 20:45	1
Ethylbenzene	ND		0.10	0.016	mg/Kg		05/24/19 09:04	05/28/19 20:45	1
m,p-Xylene	ND		0.40	0.029	mg/Kg		05/24/19 09:04	05/28/19 20:45	1
o-Xylene	ND		0.20	0.023	mg/Kg		05/24/19 09:04	05/28/19 20:45	1
Toluene	ND		0.10	0.013	mg/Kg		05/24/19 09:04	05/28/19 20:45	1
Xylenes, Total	ND		0.60	0.029	mg/Kg		05/24/19 09:04	05/28/19 20:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*75 - 120*	*05/24/19 09:04*	*05/28/19 20:45*	*1*
4-Bromofluorobenzene (Surr)	*96*		*76 - 122*	*05/24/19 09:04*	*05/28/19 20:45*	*1*
Dibromofluoromethane (Surr)	*100*		*80 - 120*	*05/24/19 09:04*	*05/28/19 20:45*	*1*
Toluene-d8 (Surr)	*107*		*80 - 120*	*05/24/19 09:04*	*05/28/19 20:45*	*1*

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 590-22297/1-A
Matrix: Solid
Analysis Batch: 22299

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 22297

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.020	0.010	mg/Kg		05/24/19 09:01	05/24/19 11:55	1
Ethylbenzene	ND		0.10	0.016	mg/Kg		05/24/19 09:01	05/24/19 11:55	1
m,p-Xylene	ND		0.40	0.029	mg/Kg		05/24/19 09:01	05/24/19 11:55	1
o-Xylene	ND		0.20	0.023	mg/Kg		05/24/19 09:01	05/24/19 11:55	1
Toluene	ND		0.10	0.013	mg/Kg		05/24/19 09:01	05/24/19 11:55	1
Xylenes, Total	ND		0.60	0.029	mg/Kg		05/24/19 09:01	05/24/19 11:55	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*75 - 120*	*05/24/19 09:01*	*05/24/19 11:55*	*1*
4-Bromofluorobenzene (Surr)	*103*		*76 - 122*	*05/24/19 09:01*	*05/24/19 11:55*	*1*
Dibromofluoromethane (Surr)	*101*		*80 - 120*	*05/24/19 09:01*	*05/24/19 11:55*	*1*
Toluene-d8 (Surr)	*110*		*80 - 120*	*05/24/19 09:01*	*05/24/19 11:55*	*1*

Lab Sample ID: LCS 590-22297/2-A
Matrix: Solid
Analysis Batch: 22299

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 22297

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	0.500	0.508		mg/Kg		102	76 - 129
Ethylbenzene	0.500	0.576		mg/Kg		115	77 - 133
m,p-Xylene	0.500	0.557		mg/Kg		111	78 - 130
o-Xylene	0.500	0.534		mg/Kg		107	77 - 129
Toluene	0.500	0.553		mg/Kg		111	77 - 131

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*97*		*75 - 120*
4-Bromofluorobenzene (Surr)	*97*		*76 - 122*
Dibromofluoromethane (Surr)	*98*		*80 - 120*
Toluene-d8 (Surr)	*107*		*80 - 120*

Lab Sample ID: LCSD 590-22297/3-A
Matrix: Solid
Analysis Batch: 22299

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 22297

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	0.500	0.520		mg/Kg		104	76 - 129	2	25
Ethylbenzene	0.500	0.560		mg/Kg		112	77 - 133	3	25
m,p-Xylene	0.500	0.571		mg/Kg		114	78 - 130	2	32
o-Xylene	0.500	0.555		mg/Kg		111	77 - 129	4	31
Toluene	0.500	0.553		mg/Kg		111	77 - 131	0	36

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*97*		*75 - 120*
4-Bromofluorobenzene (Surr)	*97*		*76 - 122*
Dibromofluoromethane (Surr)	*97*		*80 - 120*
Toluene-d8 (Surr)	*105*		*80 - 120*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC/MS)

Lab Sample ID: MB 590-22297/1-A
Matrix: Solid
Analysis Batch: 22301

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 22297

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		5.0	1.8	mg/Kg		05/24/19 09:01	05/24/19 11:55	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*41.5 - 162*	*05/24/19 09:01*	*05/24/19 11:55*	*1*

Lab Sample ID: LCS 590-22297/4-A
Matrix: Solid
Analysis Batch: 22337

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 22297

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	50.0	50.8		mg/Kg		101	74.4 - 124

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*102*		*41.5 - 162*

Lab Sample ID: LCSD 590-22297/5-A
Matrix: Solid
Analysis Batch: 22337

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 22297

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	50.0	52.6		mg/Kg		105	74.4 - 124	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*41.5 - 162*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 590-22416/1-A
Matrix: Solid
Analysis Batch: 22417

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 22416

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		10	4.2	mg/Kg		06/03/19 11:20	06/03/19 12:35	1
Residual Range Organics (RRO) (C25-C36)	ND		25	5.0	mg/Kg		06/03/19 11:20	06/03/19 12:35	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*99*		*50 - 150*	*06/03/19 11:20*	*06/03/19 12:35*	*1*
n-Triacontane-d62	*89*		*50 - 150*	*06/03/19 11:20*	*06/03/19 12:35*	*1*

Lab Sample ID: LCS 590-22416/2-A
Matrix: Solid
Analysis Batch: 22417

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 22416

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics (DRO) (C10-C25)	66.7	56.6		mg/Kg		85	50 - 150

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 590-22416/2-A
Matrix: Solid
Analysis Batch: 22417

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 22416

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Residual Range Organics (RRO) (C25-C36)	66.7	66.6		mg/Kg		100	50 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*96*		*50 - 150*
n-Triacontane-d62	*98*		*50 - 150*

Client: GeoEngineers Inc
Job ID: 590-11079-1
Project/Site: Carnation Dairies/0110-148-16

Client Sample ID: CD-TP-1 (1.0-2.0)
Lab Sample ID: 590-11079-1
Date Collected: 05/23/19 09:30
Matrix: Solid
Date Received: 05/23/19 11:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			22373	05/29/19 15:57	SJK	TAL SPK

Client Sample ID: CD-TP-1 (1.0-2.0)
Lab Sample ID: 590-11079-1
Date Collected: 05/23/19 09:30
Matrix: Solid
Date Received: 05/23/19 11:40
Percent Solids: 93.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			4.83 g	5 mL	22297	05/24/19 09:04	MRS	TAL SPK
Total/NA	Analysis	8260C		1	0.86 mL	43 mL	22336	05/28/19 20:24	MRS	TAL SPK
Total/NA	Prep	5035			4.83 g	5 mL	22297	05/24/19 09:04	MRS	TAL SPK
Total/NA	Analysis	NWTPH-Gx		1	0.86 mL	43 mL	22337	05/28/19 20:24	MRS	TAL SPK
Total/NA	Prep	3550C			15.28 g	5 mL	22416	06/03/19 11:20	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			22417	06/03/19 20:21	NMI	TAL SPK

Client Sample ID: CD-TP-3 (0.5-1.0)
Lab Sample ID: 590-11079-2
Date Collected: 05/23/19 10:10
Matrix: Solid
Date Received: 05/23/19 11:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			22373	05/29/19 15:57	SJK	TAL SPK

Client Sample ID: CD-TP-3 (0.5-1.0)
Lab Sample ID: 590-11079-2
Date Collected: 05/23/19 10:10
Matrix: Solid
Date Received: 05/23/19 11:40
Percent Solids: 92.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			4.9 g	5 mL	22297	05/24/19 09:04	MRS	TAL SPK
Total/NA	Analysis	8260C		1	0.86 mL	43 mL	22336	05/28/19 17:07	MRS	TAL SPK
Total/NA	Prep	5035			4.9 g	5 mL	22297	05/24/19 09:04	MRS	TAL SPK
Total/NA	Analysis	NWTPH-Gx		1	0.86 mL	43 mL	22337	05/28/19 17:07	MRS	TAL SPK
Total/NA	Prep	3550C			15.28 g	5 mL	22416	06/03/19 11:20	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			22417	06/03/19 20:41	NMI	TAL SPK

Client Sample ID: Trip Blank
Lab Sample ID: 590-11079-3
Date Collected: 05/23/19 09:30
Matrix: Solid
Date Received: 05/23/19 11:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			5 g	5 mL	22297	05/24/19 09:04	MRS	TAL SPK
Total/NA	Analysis	8260C		1	0.86 mL	43 mL	22336	05/28/19 20:45	MRS	TAL SPK

Laboratory References:

TAL SPK = Eurofins TestAmerica, Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

Laboratory: Eurofins TestAmerica, Spokane

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C569	01-06-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Method Summary

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL SPK
NWTPH-Gx	Northwest - Volatile Petroleum Products (GC/MS)	NWTPH	TAL SPK
NWTPH-Dx	Northwest - Semi-Volatile Petroleum Products (GC)	NWTPH	TAL SPK
Moisture	Percent Moisture	EPA	TAL SPK
3550C	Ultrasonic Extraction	SW846	TAL SPK
5035	Closed System Purge and Trap	SW846	TAL SPK

Protocol References:

EPA = US Environmental Protection Agency

NWTPH = Northwest Total Petroleum Hydrocarbon

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SPK = Eurofins TestAmerica, Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

11922 E. First Ave., Spokane WA 99206-5302 509-924-9200 FAX 924-9290 [✓]
9405 SW Nimbus Ave., Beaverton, OR 97008-7145 503-906-9200 FAX 906-9210 [ ]
2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210 [ ]

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: GeoEngineers

INVOICE TO:

REPORT TO: JR Sugalski jsugalski@geoengineers.com

ADDRESS: 523 E Second Ave Spokane WA 99202

PHONE: 509-363-3125 FAX:

P.O. NUMBER:

PROJECT NAME: Carnation Dairies

PROJECT NUMBER: 0110-148-16

SAMPLED BY: JWR

TURNAROUND REQUEST in Business Days *

Organic & Inorganic Analyses: [✓] 10 STD. / 7 / 5 / 4 / 3 / 2 / 1 / <1

Petroleum Hydrocarbon Analyses: [✓] 5 STD. / 4 / 3 / 2 / 1 / <1

OTHER Specify:

* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NWTPH-Gx	NWTPH-Dx	BTEX										MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
1	CD-TP-1 (1.0-2.0)	5/23/19 0930	X	X	X										S	3		
2	CD-TP-3 (0.5-1.0)	5/23/19 1010	X	X	X										S	3		
3	Trip Blank				X											1		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

590-11079 Chain of Custody

RELEASED BY: JR / PRINT NAME: Justin Rice	FIRM: GEI	DATE: 5/23/19 TIME: 1140	RECEIVED BY: / PRINT NAME: Mavia Moore	FIRM: TASP	DATE: 5/23/19 TIME: 11:40		
RELEASED BY: / PRINT NAME:	FIRM:	DATE: TIME:	RECEIVED BY: / PRINT NAME:	FIRM:	DATE: TIME:		

ADDITIONAL REMARKS:

TEMP:

PAGE 1 OF 1

TAL-1000 (0714)

15.8°C

Login Sample Receipt Checklist

Client: GeoEngineers Inc　　　　Job Number: 590-11079-1

Login Number: 11079　　　　**List Source: Eurofins TestAmerica, Spokane**
List Number: 1
Creator: O'Toole, Maria C

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Was not measured.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	N/A	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	No analysis requiring residual chlorine check assigned.